Pests

AND THEIR CONTROL

1942

SEPTEMBER

VOL. 13 NO. 9

ORGAN OF THE PEST CONTROL INDUSTRY

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EDITORIAL

Unjustified Criticism

THERE IS TODAY a perhaps unrealized tendency to feel that manufacturers, firms, stores, and dispensers of goods who have failed to supply the public demand as well as their regular customers during the critical period of the war, should be placed on a blacklist now.

Ye Ed has frequently heard such remarks and statements from individuals as well as from businessmen. Such remarks and expressions once made, travel like a prairie fire; so the primitive emotions of these individuals are heated to fever stage. Because of circumstances, these individuals have felt justified in thus expressing themselves. The more they talk about it, the more they become enraged because they are not able to obtain sufficient goods to supply their needs. They do not realize that many things plentiful before the war are unobtainable now.

They forget that we have been at war. They forget that manufacturers were instructed by our government to cease producing for civilians and to supply the armed forces. They forget that our boys in service came first, forget that all essential material and goods and food were and are needed to win the war. Those who have demanded such a blacklist after the war have allowed their feelings to lead them into unfair, uneconomic and unpatriotic remarks.

It can be truthfully said that these suppliers who so cheerfully and proudly made the greater part of their industries available for war requirements were not only obliged to disappoint great numbers of former customers, but also to pass up great numbers of opportunities to establish themselves in favor with prospective customers whom they had solicited for years. These patriotic firms regretted this condition and sought how to please and to take care of their valuable customers as well as to help them understand the critical situation they were placed in through circumstances not of their own choosing.

Then, too, there is another vital factor to be considered—one frequently overlooked, of which we should be more conscious than of anything else. And that is that veterans who saw active service in the war will comprise a substantial proportion of the sales and service staffs of the future. If businessmen give vent to their feelings to these veterans representing firms that were unable to do all that was demanded by their customers during the war period, one can appreciate the bad effect of such derogatory remarks on these ex-service men.

Have we considered the effect on us had these veterans taken the same attitude while fighting, when they heard the news of what was taking place here, while they were giving their lives over there?

The purpose of this editorial is to help us all realize that unless this negative type of thinking ceases, it will prove very costly to industry and retard its efforts to return to normalcy.

Of one thing we can be certain: no well-reputed firms would for a moment deliberately damage their future business for the sake of being contrary, knowing that war conditions would not remain always. Expecting to remain in business, they would do all in their power to take care of their customers during the critical period of the war as well as after the war.

We do not know that any PCO is guilty of this negative type of thinking. We hope not. But let us, however, all be sensible and broadminded, realizing that war has made necessary many things which have been both annoying and inconvenient. Let us not penalize those who have put patriotism first, ahead of immediate personal gain.

Zoo "Insect Exhibits"

AS A MEANS of disseminating a wider knowledge of the control of insects infesting both garden and household, and of improving industry public relations, the insect exhibit, recently installed in the Reptile House at the Bronx Zoo (N. Y.), has much to commend it.

Here the zoo-goer will be encouraged to ask questions on how to cope with insect aggressors, and invited to mail in unfamiliar bugs for proper identification.

Responsible for this novel information center is Brayton Eddy, curator of insects and acting curator of reptiles at the Zoo, who is to be commended for his pioneering initiative.

Stressed in the advice of Mr. Eddy—formerly administrator of entomology and plant industry for Rhode Island—one may hope, will be the indispensable role of the PCO, not only in preventing infestation but in controlling it as well.

There is no reason why similar exhibits should not in time become an integral part of zoos everywhere. And if he will, the PCO can do much to encourage their realization.

Time, Chemicals Not the Only Costs

CHIEF INSPECTOR Paul H. Millar, in a recent Arkansas State Plant Board release, makes the timely observation that the termite "business is still regarded by many people as a 'racket' because in some cases prices charged are entirely out of proportion, both to the operator's costs and to the benefit received by the owner of the house."

As illustrative of what he considers a fair price policy and of the frequently hostile attitude of the public to the termite business, he quotes and then discusses the following incident related by a termite operator:

"'Yesterday I inspected a public building and after giving the official in charge my recommendations she was somewhat shocked, as she advised me that a number of folks had told her that she would be robbed by the termite people. It appears that she had talked to several members of the official board of her institution, and it was more or less agreed that termite work was racket. She, of course, was expecting several hundred dollars, or thousands, I don't know which, and when I advised her that the cost would be about fifteen dollars she was quite surprised and delighted.'

"In this particular case the infestation was confined to a small area, and conditions were such that there was no likelihood of attack at other points. The necessary work could therefore be done very cheaply. In other cases, much more work may be required, sometimes necessitating heavy charges. Too often, however, it is the policy of the termite man to base his charges not on the cost of the work, as was done in this case—but on the size of the building, regardless of whether much or little work has to be done. So long as this policy is followed, it is only natural for the public to look upon the termite business with distrust."

Though we are in whole-hearted agreement with Mr. Millar's central thesis that an operator's price structure

should be based on actual costs (see editorial, June, Pests), some clarification of what may be legitimately considered costs is perhaps in order.

Of this character and basic, of course, are time (labor) and chemicals, as well as office overhead and possible inspectional services.

And last, but not in order of importance, the all-essential "know-how", without which any job of termite control becomes the sheerest kind of a racket. Acquired only via the tough grind of experience, oft-times at considerable expense (attendance at local, regional and national conferences, for example) and constant study, it is synergist in any successful formula of termite control.

Isn't the operator thus equipped—and there are many such—entitled to evaluate this knowledge as one of his basic costs? It seems to us that this is definitely in order—indeed, in the long run, not to do so will prove defeating of ethical termite control and, therefore, not in the public interest.

Credit Where Credit Is Due

AS REPORTED elsewhere in this issue, John A. Rodda who recently resigned as Chief of the Insecticides and Fungicides Unit of the War Production Board has returned to commercial enterprise.

Mr. Rodda's record of service to the Industry and in furthering the war effort during his tenure of office has been on a high plane of accomplishment.

In a recent letter he expresses some opinions he formed while in the government service, apropos both the NPCA and its very able secretary, William O. Buettner.

Because Mr. Rodda, as is his wont, graciously gives credit where credit is due, we believe what he has to say will be of pertinent interest. Writes Mr. Rodda:

"I can remember the time when those who are now respectfully referred to as PCO's were the recipients of names which were, to put it mildly, not too descriptive of their actual functions. When the Association was formed, I question seriously whether any except those select few who were closest to the problem expected it to succeed. Its potential membership had to be drawn from a very diversified group of individuals and firms.

A large measure of the success which the Association has enjoyed is due to the tireless energy of its Secretary who has insisted that its high standards not only be enforced but that they be lifted higher and higher.

Membership in the NPCA carries with it dignity and a definite sense of responsibility.

The public which today is more than ever aware of the necessity of Pest Control is likewise more cognizant of the need for a competent pest control operator.

The record of the Association during the current war has been particularly outstanding. While serving as Chief of the Insecticides and Fungicides Unit, Chemicals Bureau, WPB, I had the opportunity of observing at close quarters the manner in which it functioned.

There was complete unity of purpose and action. Matters requiring clarification were taken up with the Unit by the Secretary who then relayed the information to its membership. New regulations and changes in personnel were likewise made known promptly. Strict compliance with all allocation procedures was observed—the only assurance expected was a fair share of critical supplies when they became available after military requirements were met.

But what impressed me most was the vision of the Association. While the war was being fought, you were looking forward to the future. New control material and methods of application received your careful attention and analysis.

Your meetings were devoted to constructive planning and thinking. Contacts were maintained with recognized authorities in the field of research.

Perhaps the crowning achievement of all was the cooperative research program which the Association arranged with the Bureau of Entomology and Plant Quarantine U. S. Department of Agriculture. To my knowledge yours is the only Association having foreseen the importance and value of such a program.

Undoubtedly, your members are thoroughly convinced of its significance at this time.

Truly the members of NPCA have reason to be proud of their work and we who had the privilege of serving your members when supplies were very critical are deeply grateful for the dignified and cooperative spirit which they constantly manifest."

Klein Firm Founder Dead

GEORGE A. KLEIN, 75, president, treasurer and founder of the Klein Exterminating Co., Milwaukee (Wis.), died on July 25 at his home, following a heart attack. He founded the company in 1918 and was active in it until he became ill several months ago. He was a past president of the Milwaukee Pest Control Association.

Surviving are his wife, Ottilie; two sons, Harvey and Ellsworth; three sisters, Mrs. Cora Burke, Lake Worth, Fla., Mrs. Laura Pohlman and Mrs. Norma Partington, and four brothers, Edward, Los Angeles, Calif; William, Toledo, Ohio, and Harry and Arthur. Representing the Industry at the funeral services were a number of PCO's.

Our condolences to the Klein family, whose loss will be shared by many in the Industry fortunate to know the genial as well as inspiring Mr. Klein.

What Kind of Service Are You Rendering?

WAR CONDITIONS abroad as well as in the homeland have made many businessmen less sensitive, now, to the importance of rendering service to the public, than before the war. Before the war, competition being keen and everyone being anxious to hold what business he had as well as to obtain more business, most business men were giving fairly good service to the public and some were rendering excellent service; however, because of war conditions that swept our country over night, it was not long until we began to hear the tune from many businessmen that "because of war conditions we cannot do what we used to do". "Shortage of labor and material", they say, "have made it difficult even to carry on, much less to continue as we have in the past". We agree with some of these statements to a great extent, in that war conditions have lessened our service to the public. There were times, however, when a little more effort to help the customers rather than to blame shortage of labor and materials would have been much more helpful.

We have heard from the lips of many individuals that they are through dealing with certain firms because they have made no effort to help their customers in time of need. These were not unreasonable in their remarks and attitude. The public has realized war conditions as well as anyone, but has known that many were only offering these glib excuses and hiding behind the skirts of the war and taking advantage of the conditions when they were not wholly responsible.

Some businessmen even ventured to say that they were only interested in what they could make now, and were not interested or anxious about the future after

(Continued on Page 30)

Use of DDT In Practical Experiments and Demonstrations

By C. R. TWINN, *Ottawa, Ont.*

RECENTLY, the synthetic insecticide DDT (generically known as dichloro-diphenyl-trichloroethane) has become available for experimental purposes in somewhat larger quantities than was the case a year ago, with the result that there has been an increasing demand for information regarding its use. The purpose of this memorandum is to outline briefly some of the formulations and methods of application that have been used, especially in the field of household, medical and veterinary entomology. It is hoped that the indications given here may be helpful to investigators carrying out practical experiments or demonstrations with DDT against various species in the fields mentioned.

Among the outstanding qualities of DDT as an insecticide are its extreme effectiveness, often in minute dosages, against a wide range of species of insects, and its prolonged residual toxicity. Another outstanding quality is its ability to kill insects both by external contact and as a stomach poison. The various forms in which it is used include oil solutions, emulsions, dusts and aerosols.

Oil Solutions of DDT

DDT is soluble in many organic solvents such as cyclohexanone, benzene, xylene, acetone, ethylene dichloride, carbon tetrachloride, etc.; and proprietary products such as the Velsicol Corporation's Velsicol A.R.50-D, A.R.50 and A.R.60 (alkylated naphthalenes), and John Powell and Company's APS-202 (alkylated anthracenes and naphthalenes). Some organic solvents are impracticable because of fire hazard, unavailability, high cost or toxicity to man. Vegetable oils are not suitable because DDT in solution in such oils is readily absorbed through the skin. It has been indicated that a 5 per cent solution in petroleum oil may be safely used if reasonable precautions are taken to prevent excessive contact of the solution with the skin. DDT goes into solution in kerosene and fuel oil rather slowly and if lumpy should be crushed before being stirred into the oil. Oil solutions have proved useful in the control of a variety of insect pests.

The solubility of DDT in acceptable solvents used in preparing oil solutions is as follows:

Solvent	Solubility (grams DDT per 100 ml. solvent)	
Cyclohexanone	100-120	
Xylene	56-62	"Per cent by weight. The solubility in grams of DDT per 100 ml, solvent would be in excess of 60."
The Velsicols	38-45	
APS-202	30	
Fuel Oils*	Approx. 8-10	
Kerosene (crude)	Approx. 8	
Kerosene (refined deodorized)	Approx. 4	

*Such as diesel and furnace fuel oil.

Benzene, ethylene dichloride and carbon tetrachloride are good solvents but are omitted from this list because of undesirable characteristics. They are toxic to man and benzene also presents a fire hazard. Acetone is a water-soluble solvent of DDT. Cyclohexanone is an excellent solvent but at present is expensive and not readily obtainable.

DDT Emulsion

A useful emulsion concentrate developed by the United States Bureau of Entomology and Plant Quarantine has the following formula:

DDT (Tech. grade)	25 per cent
Xylene	68 per cent
Triton X-100*	7 per cent

*The product of Rohm & Haas Co., Philadelphia, Pa.

Xylene is the solvent and the Triton X-100 the emulsifier. This forms a stable emulsion on addition to water. The water is added, with constant stirring, in whatever quantity is necessary to obtain the desired concentration of spray solution. A ready to use proprietary product is Geigy's Gesarol Emulsion (20% DDT). DDT emulsions are suitable for use as residual sprays in buildings, as mosquito larvicides and as sprays or dips for livestock. Emulsions containing 1 per cent or less of DDT have been reported effective in controlling external parasites of livestock.

DDT Residual Sprays

The deposit from DDT residual sprays has been found to remain toxic to flies, mosquitoes, bedbugs and certain other insects for periods extending into weeks or months. Reports of studies in the United States, the United Kingdom and elsewhere indicate that while smaller percentages are effective for varying periods, oil solutions or emulsions containing 5 per cent by weight of technical grade DDT applied at rates of 50-200 milligrams of DDT per square foot give excellent results and are practical and satisfactory for use under most conditions. The most generally used oil carrier for these sprays is kerosene. For aqueous emulsions the DDT-Xylene-Triton X-100 formula is satisfactory.

The type of surface on which DDT sprays are applied is reported to have a considerable effect on the period of residual toxicity. For instance, it has been indicated that the DDT deposit may quickly lose its toxicity to insects when applied on newly painted surfaces, whereas it may retain it for long periods on unpainted materials. Furthermore, repeated rubbing or washing of smooth surfaces may reduce the toxic deposit.

Residual Oil Sprays for Household Use

Deodorized kerosene which is the base oil of most fly sprays is satisfactory for preparing residual sprays for use in household, industrial and business premises. If the concentration is less than 4 per cent the DDT will go into solution (although rather slowly) without the aid of an auxiliary solvent. If higher concentrations are desired the DDT may be put into solution in a minimum quantity of a good solvent, such as one of the first four solvents previously listed, which should then be added to the requisite amount of kerosene to attain the desired dilution. Percentages should be estimated on a weight basis. Kerosene weighs 8.08 pounds per imperial gallon,* thus one pound of DDT is sufficient to make 2.5 gallons of spray containing 5 per cent DDT.

Residual Oil Sprays for Barns, Stables, Piggeries, Outdoor Latrines, etc.

In buildings such as these where considerations of odour and possible staining are not significant, ordinary

RELEASED

FOR HOME-FRONT USE

PENCO

DDT

INSECTICIDES

THANKS to a partial release by the War Production Board, Pennsylvania Salt Manufacturing Company will soon make this sensational insecticide available for commercial use.

Having produced DDT for the U. S. Government—for controlling the spread of louse-borne typhus in Europe and for control of insect-borne tropical diseases in the Pacific, Penn Salt is processing Penco DDT in dust and spray bases for convenient, effective use by professional exterminators and householders.

Penco DDT will be available in increasing quantities as the demands of war diminish.

PENNSYLVANIA SALT
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Chemicals
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unrefined kerosene may be used as the carrier. As crude kerosene is capable of dissolving more DDT than the refined product, no auxiliary solvent is required to obtain a 5 per cent solution.

Application of DDT Sprays

To apply DDT oil or emulsion sprays, portable compressed air sprayers of the knapsack or the cylindrical shoulder strap type may be used, or the application may be made with a power sprayer. A fine wet (not a mist) spray is desired. The spray nozzle should be held within twelve inches of the surface, applying enough spray to wet it with a minimum of loss by run-off. One gallon of spray applied to a surface area of 1000 to 1500 sq. ft. would represent a deposit of approximately 180 to 120 milligrams of DDT per square foot. Walls, especially near windows, window frames, ceilings and other places where flies congregate should be sprayed. Application to the inside and outside of window and door screens may be made with a whitewash or paint brush.

The operator should avoid excessive contact with the spray material and to this end should wear gloves and coveralls and preferably an oil-proof apron. He should also avoid inhaling the spray as much as possible by wearing a mask or piece of gauze over the mouth and nose. When applying an oil spray suitable precautions such as no smoking should be taken to prevent possible fire hazard, and windows and doors should be kept open to facilitate the evaporation and dispersal of the vapours from the kerosene.

In treating for bedbugs, the spray should be applied thoroughly to bedsteads and mattresses as well as to walls, paying particular attention to cracks and crevices in which the bugs normally hide.

Five per cent DDT sprays have been used successfully in the control of fleas in buildings by spraying the floors and about two feet up the walls at the same rate as for flies and bedbugs.

DDT emulsion or oil sprays are very effective against mosquito larvae. As little as one quart of oil solution or emulsion containing 5 per cent DDT applied per acre of water surface has given good results. For the oil sprays a fuel oil that will spread readily in contact with water is satisfactory. In view of the difficulty of spraying so small a quantity over so large an area with the equipment generally available, it is suggested that a greater dilution, such as 1 per cent be used, increasing the quantity accordingly. Indications are that emulsions containing DDT are more effective against culicine larvae (the common form in Canada) than oil solutions.

Investigators report that DDT sprays applied to house fly breeding places such as manure piles and garbage dumps do not kill the eggs, pupae or larvae. However, such treatment has value in killing flies which emerge from or visit such places.

Evaluating Results From Residual Sprays Used in Practical Demonstrations

In evaluating the effectiveness of DDT residual sprays in the control of insects such as flies in buildings, it should be borne in mind that the insects do not die immediately after coming in contact with the deposit. If flies are abundant in the neighborhood and windows and doors are left open and unscreened, it is likely that the fly population in the building will be continually changing, so that many of the affected flies will leave the premises and die elsewhere and the ingress of flies from outside will maintain an active infestation. On the other hand if the building is well screened and large numbers of flies do not continually gain admittance through screen doors carelessly left open, or because of the too frequent opening and closing of such doors, the effect of the DDT deposit should readily become apparent. Even in unscreened buildings the effect should be visible in the cool of early morning before the flies outdoors resume their daytime activity.

In practical experimental demonstrations of fly control with DDT residual sprays, such as in a stable or barn, it is suggested that portions of areas of walls or partitions favoured as resting places by the flies be marked and measured, with a view to counting the flies thereon at intervals before and after the application of the spray, to obtain an indication of its effect on the numbers present. Coupled with this, areas beneath windows may be selected to ascertain the number of dead flies. Such areas would have to be protected from cleaning activities until after the counts had been made. Where several buildings of a similar character are available for treatment in the same vicinity it would be of value to leave one untreated as a check, and to make comparable counts of living and dead flies in the sprayed and unsprayed buildings.

DDT Dusts

Because of the difficulty of grinding and mixing DDT with diluent materials it is not practicable to prepare satisfactory dust mixtures without special equipment and technique. However, dusts containing various proportions of DDT ground with a diluent such as pyrophyllite or talc are available for use against a variety of insects including household and industrial pests and certain ectoparasites of man and animals. DDT in dry form is not absorbed through the skin and a 10 per cent powder is considered safe for general use, but should be kept away from foodstuffs. The prepared dusts so far used experimentally in Canada have been obtained from the Geigy Co., Inc., 89-91 Barclay St., New York City. For household and livestock use these include Neocid A5 Powder (5% DDT) and Neocid A10 Powder (10% DDT). The agricultural dust Gesarol A3 (3% DDT) may also have value against certain of these insects.

The DDT powders have been found very effective against human head, body, and crab lice, and useful in the control of cockcoaches, silverfish, ants, crickets, wasps, bedbugs, fleas and various external parasites of animals.

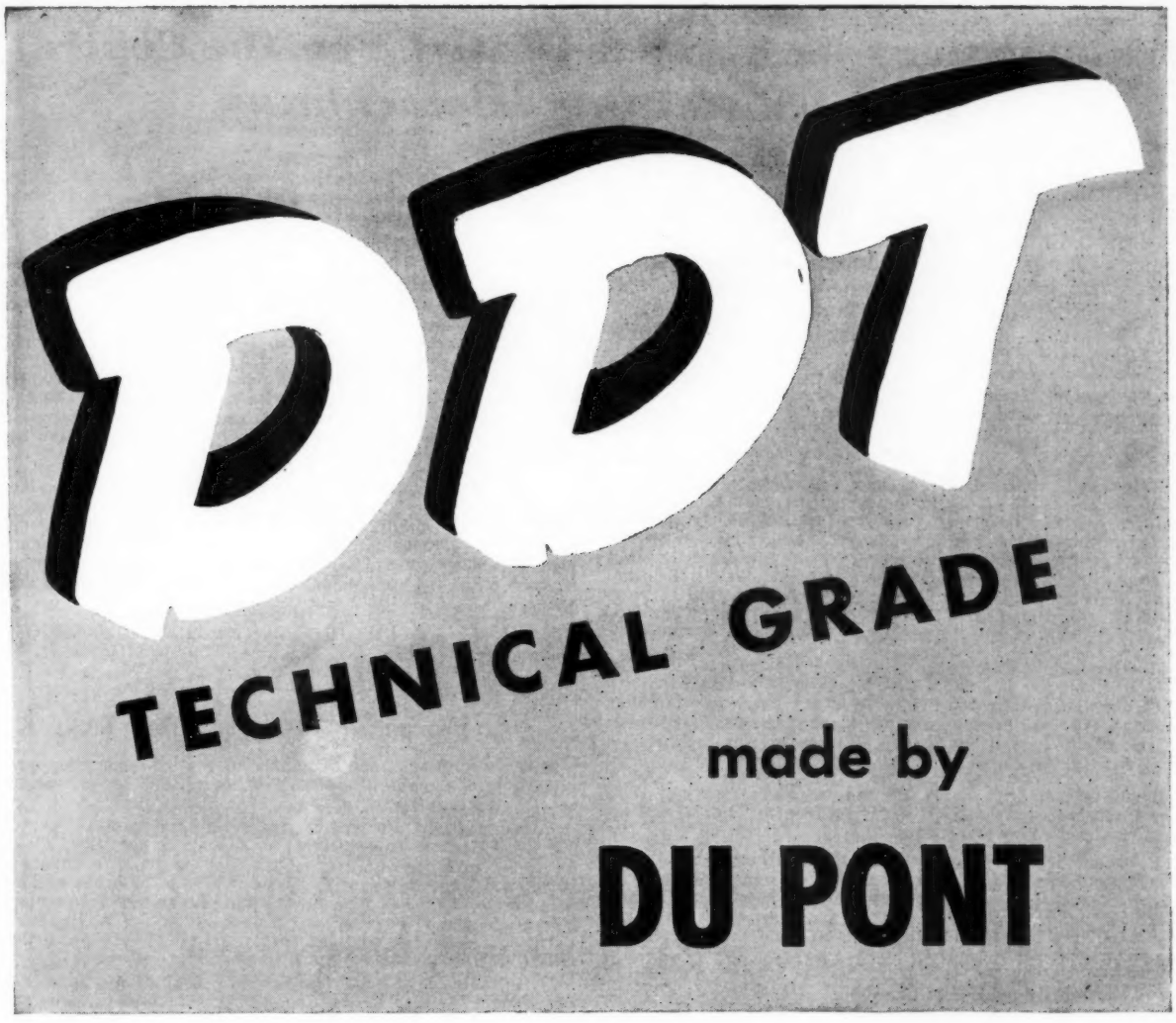
Against body, head and crab lice the 10 per cent DDT powder may be applied from a can with a sifter top. For body lice the powder should be dusted on the inner surfaces of underclothes, shirt and trousers, paying particular attention to the seams and using about one ounce of material per individual. The powder should be thoroughly distributed through the hair of the head for head lice, and on the hairy parts of the body, especially the pubic and perianal regions and under the armpits for crab lice. The parts should not be washed for at least one or two days after the application and, as DDT is not an ovicide, the treatment should be repeated a week or ten days later.

Effective control of fleas and lice on dogs and other domestic animals has been reported from dusting DDT powder through the animals' hair.

To control various species of household insects the powder should be applied thoroughly by means of a dust gun or puffer to their haunts and hiding places, and left there as long as possible or until the insects have disappeared. For wasps the powder may be blown into the openings of nests after dark when the insects are inactive.

Division of Entomology, Dept. of Agriculture, Dominion of Canada, processed publication No. 25.

*N.B.—Imperial gallon herein referred to is one-sixth greater than the U. S. gallon.



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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Observations On The Use Of DDT For The Control Of *Anopheles Quadrimaculatus*

LABORATORY AND FIELD studies were conducted in the Tennessee Valley during 1943 and 1944 to provide information on the use of DDT as a residual house spray for the control of adult **A. quadrimaculatus** and on its effectiveness as an anopheline larvicide and adulticide when applied as a dust, a spray, or a thermal aerosol. The results of these investigations may be summarized briefly as follows:

1. Spray chamber tests indicated that the median lethal doses of DDT for adult **A. quadrimaculatus** males and females are about 7.0 and 12.0 mg. per 1,000 cubic feet, respectively, as compared with 1.0 and 1.5 mg. of pyrethrins.

2. Laboratory observations of wall board sprayed at rates of 40, 200, and 1,000 mg. of DDT per square foot showed that there was no significant difference in the initial toxicity to adult **A. quadrimaculatus** at the different dosages, the per cent mortality being determined primarily by the period of contact. Residual toxicity, however, was dependent upon the rate of application, though not directly proportional to it; sufficient residual toxicity to produce 100 per cent mortality to adults exposed for 60 minutes persisted for 4 to 16 weeks, depending on the dosage.

3. Wooden nail kegs treated with DDT at rates of 20, 200, and 2,000 mg. DDT per square foot retained a high residual toxicity to adult **A. quadrimaculatus** for 18 to 22 weeks; the exposure time required for a 100 per cent knockdown during the first 18 weeks varied from about 1 to 6 hours, depending upon the dosage and the age of the treated surface.

4. Barns treated with DDT at a rate of about 200 mg. DDT per square foot remained almost entirely free of flies and mosquitoes for at least 11 weeks.

5. Unoccupied experimental houses treated with DDT at a rate of about 250 mg. DDT per square foot remained toxic to **A. quadrimaculatus** adults for at least 15 weeks; occupied dwellings lost their toxicity more rapidly than unoccupied houses but remained toxic to **A. quadrimaculatus** for at least 3 months.

6. The loss of residual toxicity by a DDT-treated surface appeared to be due primarily to the flaking off of DDT crystals. Smooth enameled or pepared surfaces lost their toxicity more rapidly than rough wooden surfaces.

7. Observations in kegs, barns, and houses indicated that a DDT-treated surface exerts its repellent action as an irritant after the mosquitoes have been in actual contact with it for a short period; DDT residual sprays did not keep **A. quadrimaculatus** adults from entering houses, but they did prevent biting for a week or two and gave partial protection for as long as 8 or 10 weeks. Ninety-five to one hundred per cent of the mosquitoes which escaped from a treated house had received a lethal dose of DDT before they left.

8. The pattern of reaction of **A. quadrimaculatus** adults to DDT-treated surfaces remained rather constant over a period of 15 weeks following treatment. Exposure to DDT surfaces completely reversed the normal light reactions of the mosquitoes, making them positively phototropic.

9. Solutions of 2.5 per cent DDT in kerosene gave effective control of anopheline larvae when applied by boat oiling units at rates of approximately 0.1 pound DDT per acre, thereby making possible a reduction of about 98 per cent in the amount of kerosene normally used.

10. DDT had to be diluted with 95 per cent soapstone before a satisfactory airplane dusting mixture was obtained. With this mixture 90 per cent control of **A. quadrimaculatus** larvae was obtained over 200-foot swaths at actual treatment rates as low as 0.05 pound per acre.

11. Certain polymethylnaphthalenes (Velsicols) having a high solubility for DDT and a high boiling point were found to be ideal solvents for making liquid solutions of DDT to be applied by airplane.

12. Stearman airplanes proved to be more satisfactory for applying DDT larvicidal sprays than Cub airplanes because of their greater pay load and increased swath width. Fifteen- to twenty-per cent solutions of DDT in Velsicol applied with the Stearman unit at actual treatment rates as low as 0.03 pound DDT per acre gave at least a 90-per cent kill of **A. quadrimaculatus** larvae over swath widths of 200 to 300 feet.

13. A Stearman airplane was equipped with various types of exhaust generators for producing thermal aerosols from concentrated solutions of DDT in Velsicol. The most satisfactory was one having a terminal venturi section with a 2⅜-inch throat. Thermal aerosols distributed with this unit at actual treatment rates as low as 0.04 pound DDT per acre gave at least 90-per cent kills of anopheline larvae over swaths as wide as 300 feet. Excellent control of **A. quadrimaculatus** adults in their diurnal resting places was also obtained with this unit at application rates of about 0.5 pound DDT per acre.

14. DDT dusts and thermal aerosols gave no evidence of injury to fish or other aquatic organisms when applied by airplane at rates of 0.1 pound DDT per acre. Five-per cent solutions of DDT in kerosene applied at rates of about 0.25 pound DDT per acre were quite destructive to aquatic insects living in close contact with the water surface, particularly Hemiptera and Coleoptera.

R. L. Metcalf, A. D. Hess, G. E. Smith, G. M. Jeffery and G. W. Ludwig.—Public Health Reports, Vol. 60—July 6, 1945, No. 27.

Preventing Infection From Ticks

Control of ticks and avoidance of the infection they may carry is largely a matter of prevention, according to entomologists of the U. S. Department of Agriculture.

Rocky Mountain spotted fever in the eastern part of the United States is carried by the American dog tick, also known as the common wood tick. This tick is most commonly found along the Atlantic coast from Cape Cod to Florida and in parts of Minnesota, Wisconsin, Iowa, and Texas. It frequents chiefly tall grass and wooded areas. It is most active in the spring and early summer. Few are seen after August 1, except in the South where its period of activity is longer.

Ticks live on blood. The favorite meal of the adult American dog tick is supplied by the dog, but the blood of humans and other warm-blooded animals is also quite acceptable. This tick, like other members of its family, is flat and has eight legs. It is about one-fourth of an inch long, brownish, and is marked with white on its back. The female lays 3,000 to 6,000 brown eggs in a mass in protected places on the ground. These hatch into tiny six-legged creatures called seed ticks, which attach to and feed on the blood of small rodents, such as meadow mice. Between periods of feeding they drop to the ground, shed their skin, and eventually change into adult ticks. As the adult females engorge with blood, they become grayish. It may take only two months for a tick to develop from egg to adult, but if the weather is not suitable or if food is not at hand, it may take as long as 2½ years.

The following advice is offered by the Bureau of Entomology and Plant Quarantine to help reduce the number of ticks around homes and to avoid their attack and possible resulting infection:

"Keep grass and underbrush closely cut; destroy rodents; keep dogs away from tick-infested areas; examine yourself and your clothing thoroughly at least twice a day when in a tick-infested area; remove and destroy as promptly as possible all ticks from dogs and humans; use care to prevent the blood of crushed ticks from getting into the eye or a skin abrasion. If ticks are numerous in a yard, a spray consisting of four teaspoonfuls of nicotine sulfate (40 per cent nicotine) and 1/10 ounce of soap to one gallon of water may be applied without injury to plants and will help reduce the number of ticks for a few days. A more effective solution may be obtained by adding two ounces of sodium fluoride to each one gallon of spray. This will give control for a longer period but will cause some burning of foliage."

Please Notice

All mail for Pests should now be addressed to our new location—1200 Oak St., Kansas City 6, Mo.

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GAMMEXANE

An Insecticide With Outstanding Properties

The following material is for informational purposes only, since considerable work will have to be done before the usefulness of Gammexane can be definitively established as an insecticide in structural pest control operations.—Ed.

UNTIL RECENTLY the principal insecticides in commercial use were pyrethrum, derris, nicotine, hydrocyanic acid, paradichlorbenzene, various organic isocyanates, and the well known poisons discovered by the alchemists, arsenious oxide, arsenites and lead salts. The use of the inorganic poisons is to be deprecated because they are so poisonous to animal life and therefore dangerous if they get onto food such as fruit. Of these insect poisons hydrocyanic acid and the active principles of pyrethrum and derris, namely the prethrins and rotenone, affect insects in the smallest doses, and the pyrethrins and rotenone are not dangerous to mammals.

Since pyrethrum and derris are expensive to produce, and the supply is limited, investigators have for some years been looking for chemicals easily synthesized which would be as effective as the pyrethrins and rotenone. From 1934 over a period of five years, we, in I.C.I., investigated several thousand organic and other chemicals prepared in our various laboratories. These were tested by Dr. O. B. Lean and his staff at the I.C.I. Hawthorndale Laboratory. The general method of investigating the toxicity of chemicals was to determine the concentration necessary to obtain a 50% kill on a series of standard insects. Among the insects used were grain weevils, flies and locusts, mosquitoes and certain aphids.

A Promising Discovery

Five or six years ago we changed the method of attack and instead of testing large numbers of chemicals we selected certain insect pests and sought for the chemicals and methods best suited to fight them. Early in 1942, looking for a substance to kill the turnip flea beetle, we tried several chemicals, including heptochlorocyclohexane (monochlorobenzene hexachloride) and octachlorocyclohexane (orthodichlorobenzine hexachloride.) A sample 1,2,3,4,5,6, hexachlorocyclohexane (benzene hexachloride, the chemical formula of which is $C_6H_6Cl_6$ or 666 for short) was also tested and this was found by F. J. D. Thomas to be promising. This sample of benzene hexachloride or 666 was made in 1942 by F. D. Leicester (one of the few chemists in the Widnes laboratory whose service dates back to the days of the United Alkali Co.) by chlorinating benzene in the presence of light and crystallising the product from benzene. The results of trials against a number of insect pests both in the laboratory and on the small field scale were most encouraging, but the results were not as consistent as we expected.

We investigated the inconsistent action of different samples of 666 and K. C. Webster examined both the possibility of an impurity being the active principle and also the toxicity of the various isomeric forms of 666, the existence of four of which was established by Van der Linden in 1912. Late in 1942 pure specimens of the a- and b-isomers were prepared by J. C. Smart and their toxicity to insects was investigated by F. J. D. Thomas. It was found that both isomers were relatively inactive to weevils, the b-isomer being practically non-toxic. Early in 1943 the g-isomer was isolated and found to be more toxic to weevils than any substance which we had ever tested. It was thus established that the insecticidal action of 666 was due almost entirely to the presence of g-1.2.3.4.5.6. hexachlorocyclohexane which I shall call Gammexane. This, the active principle of 666, is present to the extent of 10-12% in the crude material.

Preparing Pure Isomers

In Smart's method of preparing pure isomers, the crude material is treated with a limited amount of methanol, in which the a- and b-isomers are relatively insoluble. Separation of the solid product (I) leaves a solution containing the g- and d-isomers and other highly soluble chlorinated bodies, very little a and some b. On evaporating the solution a small cup of practically pure g (II) is thrown down; as evaporation is continued, the next crop of crystals contains g and some b. A later crop contains g, a trace of b and some d (III). Pure a and pure b may be readily isolated from (I) by taking advantage of the low solubility of b in practically all solvents. Pure g may be readily prepared from (II) by recrystallization from chloroform. Pure d may be prepared with more difficulty from (III) by selective precipitation of a methanol solution with petrol ether, followed by recrystallisation from chloroform.

The hexachlorocyclohexanes possess considerable chemical stability. In the process of manufacture they are exposed to the action of hot water and light for a considerable period. They can be crystallised from hot concentrated nitric acid. Hence, these materials will be unaffected by continued exposure to the atmosphere. In the presence of alkalis, such as lime water at 60 degrees C. or even at ordinary temperature, hydrogen chloride is removed from the benzone hexachloride molecule, giving a mixture of the isomers of trichlorobenzene. This effect may also be brought about by mixing 666 with dry lime. Dehydrochlorination does not take place with ground limestone or chalk at room temperature or at 60 degrees C. either dry or in the presence of water. So 666 is stable in natural waters.

In the pure state the isomers of benzene hexochloride are well-defined, colorless crystals, practically insoluble in water, soluble in organic solvents, practically inodorous and possessing bitter tastes. The sharp melting points of highly purified samples are given in Table I.

TABLE I

	Isomer	m.p. °C.
a.	Alpha	157.5-158
b.	Beta	309
g.	Gamma	112.5
d.	Delta	138-139

The approximate composition of the crude material was established by three independent lines of work. In the first place the extraction of the isomers by selective solvents in the manner already described gave fairly accurate figures, especially for a and b. Secondly, comparison of the biological activity of the crude material with that of the pure g-isomer enabled the g content of the crude material to be defined approximately when it had been demonstrated that the remaining constituents did not contribute appreciably to the toxicity. In the third place, and at a later date, the composition of the crude material was directly determined by infra-red spec-

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The Great Natural **SAFE** *Vegetable Insecticide*

troscopy by Dr. Thompson at Oxford.

Examination of the solubilities of the pure isomers brought to light the consistently low solubility of the b-isomer and also the higher relative solubilities of the r and 8-isomers. The latter, when present with the impurities in the crude material, forms syrups with solvents, making crystalisation extremely difficult.

Toxicity

The toxicity to animals has been investigated by Dr. H. Taylor, who found that the following quantities per kg. of body-weight were necessary to obtain a 50% kill (in seven days) of rats when introduced into the stomach.

TABLE II

Isomer	Toxic Dose
Alpha	1.7 gm./kg.
Beta	no animals killed
Gamma	0.19 gm./kg.
Delta	1.00 gm./kg.
Mixture of isomers	1.25 gm./kg.

Experiments on the chronic toxicity showed that rats could be fed 10, 20 or 30 mgm. of gammexane per day for five weeks without effects of any kind being produced, and 100 mgm. of the mixture of isomers was fed daily with the food for two months to rats without producing any effect. These experiments are still going on, as are tests of the effect of painting the skin. The subcutaneous injection of 100 mgm. of gammexane per kilo body-weight killed 25 per cent of the rats. The rest were severely affected but recovered in three days. Of the mixed isomers 600 mgm./kg. were injected without producing any effect. The a- and b-isomers at saturated concentration did not affect goldfish. The 8-isomer slightly affected the fish at saturated concentration of 10 to 12 parts per million. Gammexane was distinctly toxic to fish at a concentration of one part per million.

Insecticidal Preparations

As a substitute for ground derris a finely-divided powder was produced, containing 20% of crude 666 and 80% of gypsum, which was further diluted with selected materials to give insecticidal powders for use on crops. For some uses the material is required in solution in an organic solvent. Solvents used in practice include methanol, xylene, carbon tetrachloride, perchlorethylene, and decahydronaphthalene (Dec.). Solutions containing 5% gammexane or more may be diluted for use with kerosene or other suitable oil. By the addition of an emulsifying agent such as selected Turkey Red Oil, concentrated solutions can be prepared which on the addition of water give a stable emulsion suitable for use in the field.

Another gammexane preparation designed for use with water as diluent is the dispersible powder, and suitable types may be prepared, either from crude 666 or from the solid product resulting from the removal of x-isomer from the crude, by incorporating an adequate amount of "Goulac," i.e., waste lye resulting from the sulphite treatment of cellulose.

Unlike many insecticides, gammexane has proved to be exceptionally stable to high temperatures. This enables it to be applied by volatilisation from hot plates, or by other heating methods, producing the insecticide in the form of a "smoke." By these means, the insecticide may be used directly against insects or to give a toxic film on walls, etc. This method of application is being investigated further.

A wide range of insect pests, including locusts, weevils, mosquitoes, and houseflies, has already been found to be lethally affected by gammexane. The median lethal dose varies considerably from pest to pest, although it is generally lower than that for other insecticides. Against certain pests gammexane has proved more toxic in laboratory tests than any other insecticide examined.

Mode of Action

As an insecticide the product has the merit of acting as a stomach poison, as a contact agent, or as a fumigant. Since these effects may be combined, the investigation of its mode of action presents difficulties and special techniques must be employed.

In spite of the great advances which have been made in recent years in human medicine we really know very little concerning the mode of action of chemotherapeutic agents upon the life processes of the cell. However, we have a few guiding principles which have emerged from recent work and these should help us to introduce some plan into the testing of chemicals IN VIVO. One of these principles has emerged from the empirical discovery of the sulphonamide drugs, namely, that the active chemotherapeutic agent masquerades as a molecule which is essential for the life of a cell. In other words, b- aminobenzene sulphonamide reacts where b- amino-benzoic acid should have been in a normal cell reaction, but is then unable to perform the next function of normal cell life.

Inositol is a metabolite which is found widespread in many types of cell and thus we would infer from our masquerading hypothesis that if we could mock up a molecule which would be similar to it not only in molecular dimensions, but also in so mephysical prerequisites then it should be taken up by an organism and gain general access to its cells. Dr. Olive Mooney has pointed out the resemblance between the hexachlorocyclohexanes and the hexahydroxycyclohexanes (inositols), and gammexane on this hypothesis resembles them closely. Thus, it is possible that gammexane is absorbed from the outside of the insect, distributed throughout some portion of the organism to the cells where a vital reaction is blocked and the organism dies.

The specificity between chemical constitution and physiological action illustrated by the separate isomers is of interest and this fact should be borne in mind when considering the action of DDT. The latter compound may also be blocking the vital reaction which is dependent upon inositol, but it must be remembered that DDT seems to have only one-fifth the power of gammexane, and it may be therefore blocking quite a separate vital reaction. All this is very speculative, but I believe that compounds of highly specific physiological potency will be found to be of great value for the chemical investigation of vital processes in the cell.

(The foregoing article, appearing in the British journal, "The Chemical Age," is an extract from the Hurter Memorial Lecture delivered by Dr. Roland E. Slade, M.C., D.Sc., F.R.I.C., M.I. Chem. E., on Mar. 8th before Liverpool section of the Society of Chemical Industry.)

DDT Restrictions Lifted By WPB

At a meeting in Washington on July 25, it was decided that each manufacturer of DDT would be allowed a small percentage of his production to sell without restriction as to end use, beginning as of August 1st.

This does not mean that unlimited quantities of DDT will be immediately available, because the military still comes first, but it does mean that what is available may be used for civilian use.

There is no indication yet of the quantity that will be available under this change.

Along with this came a warning from the United States Department of Agriculture to go slow, because the insecticide industry must bear the responsibility for the safety of the product sold, since the toxicological work on DDT has been by no means completed.

★ DOUBLE MISSION ★

U. S. NAVY PHOTOS

The ever continuing improvement of MGK Pyrocides* has been greatly stimulated by the tremendous military demands. As a result, higher standards of quality for insecticides derived from pyrethrum prevail for postwar production.

A companion program of research is now being carried on with DDT (dichloro-diphenyl-trichloroethane). In cooperation with one of America's largest chemical manufacturers, MGK is now developing and testing many new DDT insecticide formulations.

Identified and marketed under the Trade Mark "Multicide"* they will include the following:

LIQUID CONCENTRATES: Multicide Household Sprays, Multicide Livestock Sprays, Multicide Mill Sprays, Multicide Mosquito Larvicides.

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Remember both these names:

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They Both Stand for Fine Quality!

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MINNEAPOLIS • MINNESOTA

Developments In The Use Of DDT For Controlling Insects

THE STORY OF HOW U. S. Department of Agriculture scientists developed DDT insecticides for use by the armed forces against malaria and other mosquito-borne diseases may now be told. Primarily as a result of this wartime research at the Orlando, Fla., laboratory of the Bureau of Entomology and Plant Quarantine, with funds allotted by the Office of Scientific Research and Development, mosquitoes and other insects which transmit disease may be controlled over large areas of land or water.

Now, by employing a large airplane and new devices for distribution it is possible to treat more than 500 acres with 800 gallons of DDT spray within 30 minutes, and with small planes use only one to two quarts of 5 per cent DDT in No. 2 fuel oil per acre to kill both larvae and adults of the malaria mosquito. However, it is possible that DDT cannot be used for broadcast spraying over large areas in non-combat localities because of the possibility that it may upset the balance of nature by killing beneficial insects and by killing fish, birds, or other wildlife either directly or by feeding on insects killed by DDT. Research to determine facts as to this danger and devise procedures for safe use is now under way.

DDT insecticides have proved effective not only for killing the adult mosquito, but also for killing the larvae or "wigglers" that hatch in swamp and other stagnant waters and damp places. The most important characteristics of the new DDT insecticides are their stability and long-lasting toxicity. They are applied in the form of spray, dust, oil solutions and emulsions, and aerosols, depending upon the conditions of use.

At the beginning of the war an economical material that would be highly toxic in one application to both larvae and adults of mosquitoes in all parts of the world was badly needed. The material had to be one that could withstand tropical storms, remain effective for several weeks, and be applied from the air. No scientist then knew of any such material, and no manufacturer had any such product on the shelf ready for use.

Under the pressure of war needs, according to Dr. P. N. Annand, Chief of the Bureau of Entomology and Plant Quarantine under whose general direction the research was carried on, within one year American entomologists and chemists had developed mosquito-control agents that met the requirements and which 50 years of previous research had failed to uncover. By July 1943, these insecticides were ready for large-scale use in the various war theatres.

Regarding these discoveries Brig. Gen. James S. Simmons, Chief of Preventive Medicine Service in the Office of the Surgeon General recently said: "The discovery and field application of DDT to the control of insect-borne diseases will, in my opinion, prove to be the outstanding medical advance made during this war. It will exceed even penicillin in its ultimate usefulness in the preservation of health and the saving of human lives."

The First Mosquito Developments

The search for new mosquito-control materials began October 1, 1942, when funds were allotted to the Bureau of Entomology and Plant Quarantine by the Office of Scientific Research and Development on the recommendation of the Committee on Medical Research. Since two other projects in medical entomology financed by these funds were already in progress in Orlando, Fla., under the direction of Dr. W. E. Dove, the new project was also located there.

Soon after November 1942, when the first sample of DDT arrived in Orlando as an unidentified chemical in a proprietary powder, two entomologists, E. F. Knipling and R. S. Bushland, discovered that the chemical DDT had unique potency against the body louse. Then C. C. Deonier, A. W. Lindquist, and their associates quickly demonstrated that it was highly potent in killing both the young and adult mosquitoes. Within the next year, the exact dosages and mixtures necessary for an effective all-weather mosquito-control agent had been worked out.

DDT insecticides were first recommended by the Bureau of Entomology and Plant Quarantine to the military forces as a larvicide dust on May 18, and as a larvicide spray on July 14, 1943. Since that time DDT has been tested as a mosquito-control agent by several military, public, and State agencies and others, all of whom have had a share in the field tests of this newly developed mosquito control agent. The formulas and dosages worked out at Orlando are now in wide use for preventive control purposes in every country in which mosquitoes occur, and are being widely applied by the Public Health Service in extensive malaria control campaigns in the South, particularly around training camps.

DDT As a Mosquito Larvicide

Entomologists say that the development of DDT as a mosquito larvicide marks the only important advance in this field since the advent of petroleum oils (1892), and arsenicals (1921). Out of more than 3,000 synthetic organic compounds tested, it is by far the best. DDT in the proper mixtures is completely effective against larvae of the anopheline mosquito for several days when applied at the rate of 0.1 pound per acre of water surface. It also produces kills of larvae of the culicine mosquito when used at the rate of 1 part to 100 million parts of water. DDT can be used to kill mosquito larvae in three forms, as a dust, in oil solution and in an emulsion. In laboratory tests a dosage equivalent to only 1 pound of DDT to 250 acres of water surface was completely effective against full-grown larvae of the malaria mosquito (**Anopheles quadrimaculatus** Say). As a dust, DDT was toxic to 62 per cent of these larvae when applied at the low rate of 0.0001 pound per acre. In one experiment a power paint sprayer, applying DDT as a mist spray at the rate of 0.15 pound of DDT per acre, gave perfect control over the entire swamp area, for a distance of 600 feet from the point of application due to wind drift.

In general, although DDT is stable and long-lasting, its residual action or toxic effect is limited in duration when applied in dusts to water surfaces; wave action, wind and water movements cause shifting of surface films of DDT dust, with a consequent loss in effect shortly after application. In quiet pools where the vegetation is dense, effective control of anopheline breeding has been

FUMIGATION NEWS

SEPT. 1945

Published in the interest of Pest Control Operators and the use of
AERO BRAND HCN DISCOIDS AND CYANOGAS
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LEADING TEXAS PEST CONTROL OPERATORS SAY:

"WE ARE VERY MUCH IMPRESSED WITH THE USE OF HCN DISCOIDS FOR BOTH HOUSEHOLD AND COMMERCIAL INSTITUTION FUMIGATION"

DALLAS, TEXAS.—The Abel Exterminating Company, with offices in both Dallas and Houston, has been engaged in the General Pest Control field for nineteen years and fumigation work for sixteen years, on yearly maintenance contract for the control of roaches, rats, mice, and ants. AERO**Brand HCN Discoids are used for both household and commercial institution fumigations.

On one of their largest commercial fumigation jobs, done in January of this year in Houston, 1,560 pounds of HCN Discoids were used. This operation was the complete fumigation of a five-story commercial structure, each floor 150 feet wide and 150 feet deep. Three days were spent in sealing windows and wall cracks. After the building was closed for business on Saturday night, the fumigation crew took over. With six men working, three opening the cans, and three scattering the Discoids, 1,560 pounds of the fumigant were put out in exactly thirty minutes, without the slightest difficulty. The gas was set at 11:30 o'clock that night, and the building opened at noon on Sunday.

After the fumigation, the air conditioner was turned on to ventilate the structure. The HCN was pulled out through the roof for four hours before any windows were opened. The building was completely free of HCN by nine o'clock Monday morning.

The complete success of this job, done with HCN Discoids, is expressed in a statement made by H. O. Abel, head of the fumigation firm, who says, *"We got 100 per cent kill, with no damage to merchandise, and the company was more than pleased."*

AERO Brand HCN Discoids assure fast, positive results—better and more profitable jobs.

SOME INTERESTING FACTS ABOUT HCN

HCN is slightly lighter than air, having a specific gravity of .9348. Air=1.00.

HCN is miscible with water in all proportions. It is also absorbed, to some extent, by oils, fats, and the like.

HCN does not combine chemically with foodstuffs to impair their food value. However, milk and butter, oily, fatty, and moist foodstuffs have a natural affinity for foreign odors and will take up HCN to some extent. They should be removed prior to fumigation.

HCN may affect people by both absorption and inhalation. Gas masks should always be worn during application, and sweat shirts should be worn to prevent direct contact of the gas with skin which may be wet from perspiration.

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obtained for a period of 4 to 8 weeks when DDT dusts have been applied at the rate of 1 to 2 pounds of DDT per acre. DDT dusts for this purpose can be applied with a rotary-type hand duster. DDT in a dust probably kills mosquito larvae as a stomach poison.

In combat areas, carriers or diluents for mixtures with DDT must take as little space as possible and must be practicable for making up the mosquito control agent under field conditions. Investigations of organic solvents for use with DDT by C. C. Deonier, J. D. Maple, H. A. Jones, E. E. Hinchey, and P. M. Eide disclosed that petroleum oil solutions at remarkably low dosages are satisfactory for control of the Anopheles (malarial mosquito) larvae.

The effective amount of DDT in petroleum oil is essentially the same as when applied in dust form; as little as 1 quart of oil per acre of water surface gives high kills when reinforced with 5 per cent of DDT. If existing spray equipment were able to spread a smaller volume of larvicide evenly over the water, even less DDT would control some species of mosquito larvae. For flowing water, a drip can has been used successfully to disperse DDT in oil solution. A third form in which DDT can be used is in an emulsion. Many solvents and emulsifying agents have been tested for this purpose. Entomologists H. A. Jones, H. J. Fluno, and A. B. Hendrick have found that either stable or quick-breaking types of emulsions can be used at dosages of DDT comparable to those effective for dusts or oil.

DDT is also very effective against larvae of the culicine mosquitoes, which transmit dengue. In suspensions, dosages of 1 part per million or higher will kill mosquitoes breeding in rain barrels for several days after application. In field applications, suspensions and emulsions of DDT have been found more generally effective against fresh-water and salt-marsh culicine mosquitoes than was DDT as a surface application in dusts or oil solution. Dosages as low as 0.05 parts per million were more generally effective against the fresh-water and salt-marsh culicine mosquitoes than was DDT as a surface application in dusts or oil solution. Dosages as low as 0.05 parts per million were also effective against the yellow fever mosquito (**Aedes aegypti** (L.)).

Aircraft offers the most efficient method for applying DDT over large areas. Special portable equipment was designed by C. N. Husman and O. M. Longcoy at the Orlando Laboratory in 1943, and DDT larvicidal sprays and dusts applied from small airplanes. As a result of this early development, the armed forces were able to develop the aircraft distributing apparatus now in use. This portable equipment makes it possible temporarily to convert any small plane into an efficient mosquito-killing device. With dosages of 1 to 2 quarts of 5 per cent DDT in No. 2 fuel oil per acre, highly satisfactory kills of anopheline larvae were obtained.

As a result of recent tests by the Army and Navy of the application of DDT sprays from large aircraft, the Bureau of Entomology and Plant Quarantine can now recommend under proper conditions the use of planes carrying up to 800 gallons of DDT sprays as well as the equipment needed in dispersing it at the proper dosage. With this capacity, a large plane could treat more than 500 acres within 30 minutes without reloading. By increasing the concentration of DDT in the spray it may even become possible to step up the pay load several times. However, until it is known that DDT will not have a permanently injurious effect on fish, beneficial insects, birds, and on other wildlife in or near sprayed areas when it is broadcast widely by aircraft, the Bureau can not recommend it for such use in civilian areas.

DDT as a Mosquito Adulticide

Prior to the development of DDT, controlling adult mosquitoes over extensive areas was not thought to be possible. Early in 1943, Randall Latta and C. S. Wilson, of the Bureau of Entomology and Plant Quarantine, conducted tests with pyrethrum aerosols and smokes, which showed promise. Following this lead, the Orlando group of scientists began to explore the potentialities of DDT in controlling adult mosquitoes out-of-doors. A. W. Lindquist and B. V. Travis demonstrated that the adult of a Florida salt-marsh mosquito (**Aedes taeniorhynchus**) could be virtually eliminated from dense vegetation with sprays and dusts containing as little as 0.1 pound of DDT per acre. For this purpose, dusts were less effective than sprays.

Aircraft Spraying for Control of Adult Mosquitoes

On the basis of this work, Husman and Longcoy in 1943 designed their spray equipment for light planes, which disperses a 5 or 10 per cent solution of DDT in fuel oil at the rate of two quarts per acre. Excellent control of the adult salt-marsh mosquito in densely wooded areas was obtained by this means. Use of a 20 per cent DDT solution from exhaust equipment installed on a small commercial plane in 1943 was also successful. In April 1944, A. W. Lindquist, in cooperation with the U. S. Army in the Panama Canal Zone, obtained a 98 to 100 per cent control of two mosquito species when two quarts of 10 per cent DDT solution were applied by a Husman-Longcoy spray unit installed on a small plane. During December 1944, A. W. Lindquist and C. C. Deonier assisted the Navy in additional tests in Panama, in which DDT was dispersed from the exhaust of a fast-flying bomber type of plane. In these tests, the adult mosquito population was reduced over 95 per cent.

During January and February of this year, entomologists H. H. Stage, E. F. Knipling, A. H. Madden, and C. B. Wisecup assisted the Army Air Forces Board in carrying out several tests with large planes to disperse DDT sprays. All tests were highly satisfactory. A reduction of 90 to 99 per cent of all species of mosquitoes present, both larvae and adults, was obtained within 24 hours after treatment. These experiments were carried out in large jungle areas, where dense foliage presented severe handicaps to thorough treatment.

Information obtained from these tests will have probable use in the post-war period in control of mosquito-borne disease. It now seems reasonable to expect that in epidemics of malaria, dengue, and filariasis, the carriers of the disease may be eliminated over large areas within 24 hours. This was not thought feasible before the war. Investigations during the summer of 1944 near Cocoa Beach, Fla., were made to determine the effect of DDT residue spray treatments on adult salt-marsh mosquitoes when applied to dense vegetation. The results showed that five gallons of 5 per cent DDT in No. 2 fuel oil were effective in some plots for as long as 2½ months after application.

DDT in Aerosols

The addition of DDT to the highly efficient aerosol "bomb" was first investigated by the Orlando group in February 1943. This "bomb" is now in general use by the armed forces against mosquitoes in pup tents, airplanes, barracks, and fox holes. Invented by Bureau scientists, L. D. Goodhue and W. N. Sullivan, the aerosol "bomb" is a metal container about the size of a quart jar, containing pyrethrum dissolved in Freon, a liquefied

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gas, under pressure. By pressing a valve, the Freon and the insecticide are forced out in the form of a very fine mist.

After months of testing and evaluating many formulations, the chemists and entomologists at the Beltsville Research Center and the Orlando, Fla., laboratory were able to recommend the aerosol DDT formula now in use by the armed forces. The adding of DDT to the original aerosol formula increased its efficiency in the early knock-down of both flies and mosquitoes and produced higher kills of these insects after knock-down.

Per unit of toxicant, pyrethrum is perhaps 15 times as toxic as DDT to adult mosquitoes, but it is less toxic to flies. Extensive laboratory tests against these two groups of insects established the most effective ratio of the two insecticides necessary to obtain the desired results—a quick knock-down resulting from the use of pyrethrum and a high mortality by the use of DDT. During these studies in July 1943, the Orlando entomologists, A. W. Lindquist and associates, demonstrated that ordinary motor oil was an effective substitute for sesame oil, the activating agent in pyrethrum aerosols. Later H. A. Jones and his associates found the use of this oil would also increase the effectiveness of DDT.

Liquefied gas aerosols have also been found a promising means of applying DDT for the control of the malaria mosquito larvae. In laboratory tests complete mortality of larvae was obtained up to 60 feet from the point of release of the aerosol. When stearic and oleic acids were incorporated in the aerosol, the deposits remained effective after several artificial rains. Tests were also made of several DDT aerosol formulas applied from the ground under field conditions. Virtually complete kills of the malaria (anopheline) larvae were obtained at a dosage of 0.1 pound of DDT per acre.

DDT in General Purpose Sprays

Early in 1943, entomologists E. R. McGovern, W. A. Gersdorff, and J. H. Fales, working at Beltsville Research Center, found DDT to be highly effective against flies and mosquitoes at low concentrations when used in petroleum oils. Following this, the Orlando scientists, A. W. Lindquist, H. O. Schroeder, and E. F. Knipling, made studies on the effect of the size of particles of DDT insecticides, and determined that, when finely atomized, DDT and pyrethrum sprays were equally as effective as the liquefied gas aerosols. Later, these workers demonstrated that the amount of the pure active ingredient (DDT) applied was the governing factor in effectiveness of the spray, and that the amount of the diluent, within limits, was of little importance. For example, they showed that 1 part of a 20 per cent DDT spray is as effective as 20 parts of a 1 per cent DDT spray. This general principle was found true for pyrethrum also.

The results of this discovery are savings in material and transportation costs for supply to armed forces. By increasing the concentration of DDT in each spray, the bulk of the diluent, which has to be shipped with it for mixing, can be reduced considerably. In addition, this discovery permits the development of practical small light hand-operated sprayers. Patent applications have already been made for pocket sprayers about the size of a small flashlight which contain enough spray to treat a fox hole several times a night for more than a month, by using very small amounts of highly concentrated DDT insecticides for each treatment. DDT spray in this form is not available for civilian use now, and the dispenser device may not be on the market for some time after the war ends, but this discovery makes it more practicable to use DDT for control of mosquitoes, flies, and other household insects in the post-war home.

DDT as a Residual Spray

For control purposes, the most important characteristic of DDT is its stability or long-lasting toxicity. It is the first contact insecticide which does not have to make contact with the insect at the time sprayed. DDT is toxic to many kinds of insects when they touch its crystalline deposits even several weeks after it has been applied. Orlando entomologists proved this against a wide variety of insects, such as body lice, cockroaches, bedbugs, and flies. It has been learned since that a Swiss scientist, R. Wiesmann, was the first to report the use of DDT as a fly spray (1943).

Following preliminary observation on the residual properties of DDT, extensive studies were made to determine the value of DDT residues in killing adult mosquitoes. The first laboratory experiments made early in 1943, demonstrated that the malaria mosquito **(Anopheles quadrimaculatus)** adults were highly susceptible to DDT spray deposits and that the minimum effective dosage was less than 10 milligrams of DDT per square foot of surface. Ten milligrams of DDT is in size less than the point of a sharp pencil. Higher dosages, 50 to 400 mg. per square foot, about as much, said one entomologist, as would cover "the foot of a gnat," continued to kill mosquitoes for at least 32 weeks, when the insects were allowed to remain in treated cages for 24 hours. Many types of DDT solutions and emulsions were tested on different types of surfaces, but ordinary kerosene and emulsion sprays are considered the most practical at the present time.

In practical field tests near Tallahassee, Fla., and Stuttgart, Ark., in August 1943, by J. B. Gahan, B. V. Travis, F. A. Morton, and A. W. Lindquist, it was found that at the end of the mosquito season, about two months later, treated surfaces inside houses were still killing mosquitoes that came in contact with them.

In May 1944, in a large-scale field test, started near Stuttgart as a cooperative project with the Arkansas State Board of Health and the U. S. Public Health Service, a 5 per cent DDT kerosene spray and a DDT aqueous emulsion were applied to all known resting places of adult malaria mosquitoes in two separate areas of nine square miles each. One area was treated at an average rate of 208 mg. of deposit per square foot and the other at 56 mg. per square foot. In September, four months later, the resting places in the area receiving the heavier dosage were still practically free of mosquitoes. A reduction of about 98 per cent of the mosquitoes was obtained compared with the catches in the control area of the same size. A reduction of 94 per cent was obtained in the area which received the lower rate of DDT spray.

Although no measures were taken to kill the mosquito larvae, in test plots, extensive larval dipping records in the rice fields in each of two treated plots indicated at a 63 and a 57 per cent reduction. James B. Gahan and Arthur W. Lindquist, of the Bureau of Entomology and Plant Quarantine, and John E. Taylor, of the Arkansas State Board of Health, demonstrated for the first time that a malaria mosquito (anopheline) population could be reduced over a large area by measures applied against adults. Studies by A. H. Madden, A. W. Lindquist, and E. F. Knipling have also shown that DDT residues may be useful in treating airplanes as a protection aginst the introduction of noxious insects.

Entomologists say that this residual feature of DDT sprays will become the most important factor in mos-

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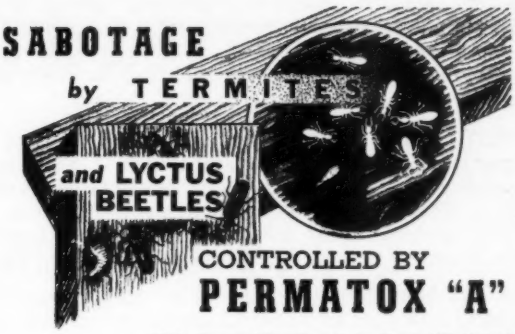

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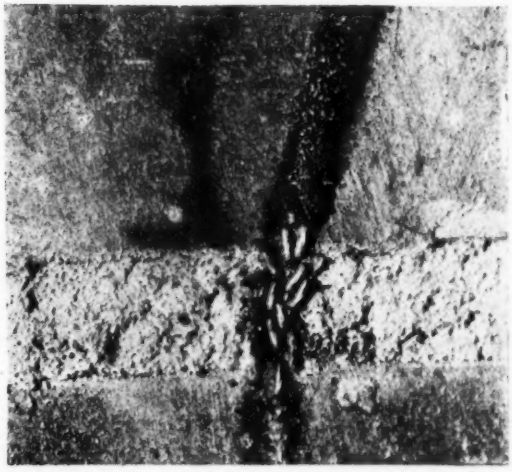

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quito and malaria control programs. Many mosquito species which transmit diseases are highly domesticated and have short flight ranges. Residual sprays are the only known method of effective control for these species.

Toxicity of DDT to Aquatic Life

DDT can not be used in aircraft for broadcast spraying over large areas to kill mosquitoes if it will also upset the balance of nature by killing beneficial insects, such as the natural enemies which help control various forest and crop pests, and by killing fish, or birds feeding on insects killed with DDT, or other wildlife.

It has been found in laboratory tests, that DDT in concentrations greater than 0.1 parts per million is toxic to goldfish. In numerous field tests, with surface applications in dusts and oils at dosages of 0.1 to 0.2 pounds of DDT per acre, no harmful effects of fish have been observed by research workers.

Surface-swimming insects such as whirligig beetles are affected by almost all mosquito larvicides, including DDT. Others include water boatman, back-swimmers, dragonfly, and damselfly nymphs, and some fly larvae, particularly some of the non-biting gnats which were severely affected by suspensions of DDT. In water four inches deep, two quarts per acre of a five per cent DDT in a xylene emulsion applied from an airplane caused bloodworms to leave their tunnels and die in three or four hours. Spiders, crayfish, and frogs have been affected by heavy dosages.

In no instances have any injurious effects of application of DDT for killing mosquito larvae been observed on warm-blooded wildlife. Further research on the effect of DDT on other insects, fish, and wildlife is required before DDT can be recommended for general use against mosquitoes by aircraft spraying of large areas. Entomologists agree that it is the most effective mosquito control agent yet known, and, in the hands of experienced mosquito control operators who understand it and know how to appraise all factors, it would be safe for use in many infested areas.

THE BAT BUG and ITS CONTROL

By **ARNOLD MALLIS**

THE BAT BUG, **Cimex pilosellus** (Horv.) is a household insect that pest control operators on occasion encounter in making their rounds. This pest problem is nearly always related to the "bats in the attic" situation.

Stearns (1937) notes that in Smyrna, Delaware, this bug was associated with the bats **Myotis lucifugus lucifugus** which dwelled in a garret above a store as well as in the adjoining residence. In this particular instance the bugs caused many painful bites on the inhabitants. "The guano and other debris were removed from the garret; the bats were driven forth and the bugs killed by thorough spraying with creosote oil; all points of entrance were closed; and the family experienced no further annoyance."

Gould (1941) records an infestation of the bugs in an attic in Battle Ground, Indiana. The bats used the attic as a roosting place, and the bugs crawled into the rooms when these were heated. Dead bats and much excreta were removed from the attic; the living bats driven out, and all entrances closed.

The writer upon investigating a complaint about bedbugs in Newark, Delaware, determined the insect as the bat bug, **Cimex pilosellus** (Horv.), and not as the true bedbug. The wooden frame house consisted of two floors and a large attic that had been renovated into an attic apartment, with the eaves walled off. Much to the consternation of the tenants in the attic and those on the second floor, an occasional bat bug was encountered. These tenants mistakenly believed these bugs to be bedbugs. In this infestation the tenants did not complain about bites.

Although the owner of the apartment house had removed several bushels of "guano" from the eaves, and had closed all evident entrances into the attic, the bat bugs were still present, even though uncommon. The writer upon inspecting the area in the walled-off eaves was unable to find any of the bat bugs, or their cast skins, but interestingly enough came upon many larval skins of the black carpet beetle, **Attagenus piceus** Oliv.

A local pest control operator undertook the fumigation of the house. He used a total of 16½ lbs. of Zyklon Discoids, having previously sealed the windows and other openings. Since the attic area was supposedly the source of the infestation, and since the roof in the walled-off eaves was of loose construction, 7½ lbs. of Zyklon Discoids were discharged here, with the remaining 9 lbs. distributed on the second and first floors. There were no further complaints about the presence of the bat bugs nine months later, and it may be concluded that the infestation was satisfactorily controlled.

LITERATURE

Gould, G. E.—1941. Bat bugs in a lodge hall. Pests 9(5):28.
Stearns, L. A.—1937. Important insects of the year. Del. Agr. Expt. Sta. Bul. 207, p. 29.

Research Findings

Methyl Bromide As a Fumigant for Dairy Factories—By E. M. Searls, F. W. Fletcher, and E. E. Kenaga (Co-operative project between The National Cheese Institute, and The Dow Chemical Company).

Summary and Conclusions.—Fifteen methyl bromide fumigation tests were conducted in commercial dairy plants and cold storage warehouses in the cheese-producing areas of Wisconsin. With proper application, methyl bromide gave excellent control of cockroaches, cheese skippers, cheese mites, rats, and mice, as well as other minor pests of dairy plants and cold storage warehouses.

Practical methods were developed for treating these plants economically and with little interference to normal factory operations.

Methods are given for preparing buildings for fumigation, various ways of applying the gas, dosage requirements for various pests, and suggestions with regard to circulation of the gas and ventilation of buildings, as well as certain safety precautions.

No adverse effects were encountered from the use of methyl bromide either on dairy products or factory equipment.—11-16-44.
—*Jour. Econ. Ent., Vol.* 37, *No.* 6, *Dec.*, 1944.

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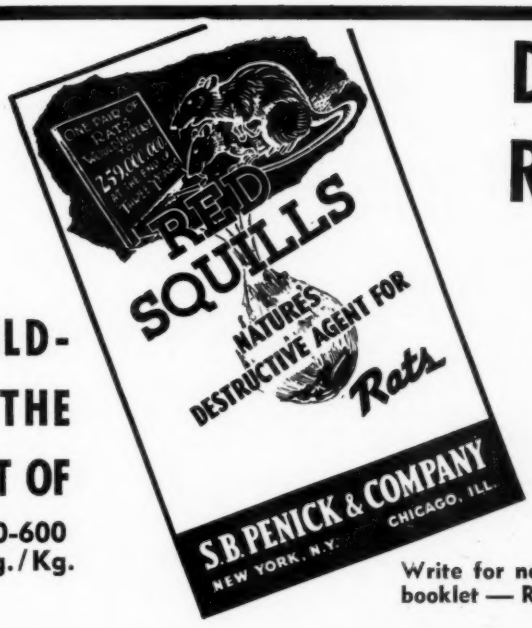

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CONTINUED IMPROVEMENT in methods employed in the production of fortified red squill has made available to pest control operators and the general public, an extremely efficient raticide, but the effectiveness of this product is entirely dependent upon proper usage. Correct procedures in its use can best be learned from men in the Fish and Wildlife Service and the Pest Control organization who have been in close contact with red squill development from the start.

Red squill has been belittled, and not without cause, by many unfortunate operators who bought what was represented to be highly toxic squill and suffered embarrassment and loss of good will when they tried to use it. Naturally, they blamed the importers for having sold them an inferior product, but the fact is that most of the importers were acting in perfectly good faith, having purchased what they believed to be a highly toxic squill.

The problem of securing good quality squill was investigated by researchers from the Fish and Wildlife Service and the Massachusetts Agricultural Experiment Station in the early 1930's and as a result of their investigations, squills of better quality began to appear on the market. Several methods were proposed for the determination of the toxic values of red squill. About 1940 the Fish and Wildlife workers at the Denver laboratory devised a method for the fortification of raw red squill, a process whereby a poor quality squill might, through special treatment, be rendered highly toxic and well suited for rat control. Based on the Fish and Wildlife method, but with some modification, fortified red squill is now being produced at a toxic level which ranks it with the best raticides. Economically, it has few, if any, superiors.

The ready availability, the comparatively low cost, the usability and safety features of fortified red squill powder or extracts make it an attractive item to add to a commercially prepared rat bait. During the next few months a variety of commercially prepared squill baits will undoubtedly be offered for sale. Although many of these will be good, others will be much less effective, and the difference in effectiveness will be determined in the majority of instances, by two factors: strength and carrier. Some manufacturers will attempt to reduce the recommended squill concentration with the hope of increasing their margin of profit. It need hardly be said that such "economy" is unwise, for sales and reputation will rapidly decrease as the bait fails in its intended purpose. The second factor, that of carrier for the squill, presents more of a problem. Carriers will of necessity have to vary, for no carrier is entirely satisfactory under all conditions. Commercially prepared baits sold in one section of the country might have a grain base, while in other sections a meaty or some other type of base might be indicated. Selection of carrier will, therefore, depend upon the eating habits of the rat population of the area where the baits are intended to be sold.

The Fish and Wildlife Laboratory at Denver has set the standard for fortified red squill as 1.d. 50 of 500-600 mg/kg., and any fortified squill that is offered for sale should meet this standard. On this basis the recommendation for an effective raticide calls for the addition of fortified red squill (500-600 mg/kg) to a carrier that is attractive to rats, in the proportion of **one** part of squill to **nine** parts of carrier. The use of less than ten per cent is definitely not encouraged, for it will frequently lead to unsatisfactory results. The use of ten per cent may seem excessive to many manufacturers and pest control operators, but in the composition of any bait intended for a poisoning operation, an amount in excess of a lethal dose is necessary in order to provide for rats with abnormal feeding habits or rats which may be particularly resistant to the poison being used. Field and laboratory tests have indicated that a rat will ordinarily consume, at one feeding, an amount of food equal to approximately one per cent of its body weight. On this basis a rat weighing 200 grams may be expected to consume approximately **two** grams of bait, which would contain 200 milligrams of squill. This consumption would be at the rate of 1000 mg/kg or considerably in excess of a lethal dose. Furthermore, this proportion allows for the rat that may consume less than one per cent of its body weight, and increases the probability of his consuming enough for a lethal dose. This principle should be carefully observed by the pest control operator when he is preparing a squill bait for field work.

It should be borne in mind that in the testing of commercially prepared squill baits for toxicity ratings, the above recommendations will be considered. Furthermore, if a commercially prepared squill bait is to be approved for field use by the Fish and Wildlife Division, as well as this laboratory, it must meet the following specifications: When fed to a series of not less than 20 male rats at a one per cent level, (i.e., feeding the rats at the rate of **ten** grams per kilogram of rat weight, or 10,000 mg/kg.) it must produce a "kill" of 90 per cent or better.

It is not the intention of the writer to imply that fortified red squill is the solution to all rat control problems, for it certainly is not a cure-all. I have simply pointed out that the fortified red squill now available to the trade is very adaptable to the needs of the pest control operators as well as potential manufacturers of squill baits. This product when used in accordance with the recommendations set forth above, will yield effective and encouraging results.

Kenya Pyrethrum Delegation Dinner Host

About 40 persons interested in the pyrethrum trade in this country were tendered a dinner by the Kenya Pyrethrum Delegation on July 30 at the Ritz-Carlton Hotel in N. Y.

Kenya Pyrethrum Board's Chairman, Commander F. J. Couldrey, who was also a member of the visiting Delegation, expressed his appreciation for the co-operation extended the Delegation during its visit in this country. S. B. Penick, Jr., president of S. B. Penick & Co., N. Y., responded on behalf of the guests and thanked the Delegation for its gracious hospitality.

W. W. Rhodes, of Kinetic Chemicals, Inc. (division of du Pont and supplier of the Freon gas used in aerosol bombs), offered some suggestions to the end that the pyrethrum aerosol bomb might be brought within financial means of the mass market.

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THIS PRODUCT CONTAINS LETHANE A-70 AN INSECTICIDE CONCENTRATE MADE BY ROHM & HAAS COMPANY

LETHANE A-70

THIS PRODUCT CONTAINS LETHANE A-70 AN INSECTICIDE CONCENTRATE MADE BY ROHM & HAAS COMPANY

Formulated and compounded in accordance with the recommendations of The Rohm & Haas Company

1. Killing power equal to ground pyrethrum flowers.
2. Speed of action equal to pyrethrum flowers, and considerably faster than sodium fluoride.
3. Safety to warm-blooded animals.
4. Good tenacity—Sticks to insects and dusted surfaces.
5. Ease of handling in bulb type dusters or mechanical equipment.
6. Large Bulk—A given weight of powder goes farther.
7. Economical.

Priced as follows:

1—100 Lb. Bbl. .....38c per pound
3—100 Lb. Bbls. .....35c per pound
5—100 Lb. Bbls. .....33c per pound
10—100 Lb. Bbls. .....31c per pound

Terms: All prices F.O.B. Indianapolis, Indiana

A. D. BOSLEY COMPANY

INDIANAPOLIS 5, INDIANA

IT'S THE *Combination* THAT COUNTS!

• It takes more than two or three high cards to make a winning hand . . . and it's their *combination* of desirable properties that has made the Lethanes the stand-out insecticide concentrates for more than fifteen years.

1. **SPEED**—Among sprays of equal killing power, those made with the Lethanes are faster-acting.
2. **UNIFORMITY**—All Lethanes are standardized *both chemically and biologically.*
3. **KILLING POWER**—The Lethanes pack it into sprays as economically as any other available agent.
4. **STABILITY**—As concentrates or in sprays the Lethanes hold their strength indefinitely.
5. **SAFETY**—Many years use in millions of gallons of sprays prove the Lethanes are *safe.*
6. **LESS IRRITATION**—Lethane sprays are less irritating than those made with other available agents.
7. **MILD ODOR**—Lethane concentrates are mild, easily perfumed.

Pioneer synthetic insecticides . . .

THE LETHANES

. . . and still the Foremost

LETHANE 384 ★ LETHANE 384 SPECIAL

LETHANE *is a trade-mark. Reg. U. S. Pat. Off.*

Represented by Cia. Rohm y Haas, S.R.L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities.

ROHM & HAAS COMPANY
WASHINGTON SQUARE, PHILADELPHIA 5, PA.

BRANCH OFFICES: CHICAGO • KANSAS CITY, MISSOURI
OAKLAND & SOUTH GATE, CALIFORNIA

CANADIAN DISTRIBUTORS: P. N. SODEN & CO., LTD. MONTREAL & TORONTO

Phenol As A Termite Repellent

Tests previously reported[1] and still in progress, in preventing the attack of the West Indian dry-wood termite, **Cryptotermes brevis** (Walker), on most susceptible woods, indicate the value of heavily chlorinated or brominated compounds of phenol. Hexachlorophenol proves to be not as good as pentachlorophenol, but if substitution is made with copper, the resulting copper

TABLE 1

Days After Submersion Ten Minutes of Wood Sample Before Attack by the West Indian Dry-Wood Termite. **Cryptotermes brevis** (Walker)

Dilution of	.01%	.02%	.05%	.1%	.2%	.5%	1%	2%	5%	10%
Phenol								2	3	4
Orthochlorophenol								4	7	9
p-Bromophenol							7	10	12	—
2,4-Dibromophenol							7	16	18	—
Tribromophenol							3	12	14	—
Thiophenol							8	10	13	—
Pentobromophenol					5	14	uneaten to date			
Pentachlorophenol				10	13	273	337 uneaten to d't			
Hexachlorophenol					5	7	uneaten to date			
alpha-beta-Methyl-naphthalene							6	9	12	—
3,5-Xylenol							4	54	—	
Fluorene						5	7	73	—	
Phenonthrene					4	7	8	87	—	
Fluoranthene			9	10	24	25	31	360	—	
Pyrene			2	4	19	25	182	195	—	
Copper Pentachlor-ophenate	25	42	uneaten to date							

pentachlorophenate is much superior in repelling termites. Other metals of somewhat lesser value for this purpose, tested as sulfates, nitrates, chlorides, bromides and acetates, but not in other organic compounds, are zinc, ferric iron, cadmium and antimony. Minute amounts of some mercuric and mercurous salts initially make impregnated wood almost as powerfully repellent as do cuprous and cupric, but in the course of weeks or months, termites are able to eat the treated woods with impunity. Red mercuric iodide dissolved in acetone makes wood so toxic that termites die before they can crawl off the treated sample, but the wood quickly fades to its normal color and is then no longer either toxic or repellent.

Repeated tests with phenol, not in combination, indicate that its effect on the termites disappears even more rapidly. Service and laboratory tests of the phenolic glue used in the manufacture of plywood show that the termites usually begin feeding where the glue holds the sheets of wood together, although structurally this is not a point of weakness. Indeed, by comparison with other coal-tar constituents, phenol would seem one of the least promising upon which to build, except solely on the basis of low initial cost, to produce the ideal termite repellent.

Against the dry-wood termite, initial toxicity is of little importance as compared with permanence in remaining repellent, in which fluorene, phenanthrene, fluoranthene and pyrene are greatly superior (see Table 1).

The maximum effectiveness for this particular purpose would presumably be obtained by a combination of some of these organic compounds with the repellent metals. Or, if by heavy chlorination the relatively cheap naphthalene can be made to retain more permanently its initial toxic and repellent characteristics, the result of combination with the metals might be preferable even to copper pentachlorophenate. So far as known, none of the suggested compounds is commercially or even experimentally available. But if the entomologist can record and interpret the reactions of the termites, the research synthetic chemist should be able to take advantage of this information and produce such compounds, specifically designed to protect susceptible wood and wood products from termite attack.

—George N. Wolcott.
Agricultural Experiment Station,
University of Puerto Rico.

[1] Caribbean Forester, 4 (4): 145-57, July, 1943, and 5 (4): 171-80, July, 1944.

—*Science* 4-45.

Effect of Hydrocyanic Acid on Foodstuffs

The very natural question as to the effect of hydrocyanic acid (HCN) on foodstuffs is often asked. The answer, based on the results of exhaustive research by competent and interested authorities the world over, is that hydrocyanic acid (HCN) may be used to fumigate the widest variety of food products without impairing their color, texture or flavor in any way.

Hydrocyanic acid is not highly reactive, and will not combine chemically with foodstuffs ordinarily subject to insect infestation. In fumigation of domestic dwellings, however, living plants, liquid fruits and foods (such as jams and preserves) unless contained in sealed containers, should be removed. Milk and butter, if unprotected, have a natural affinity for foreign odors and should be removed.

Industrial buildings containing large amounts and great varieties of foodstuffs are regularly fumigated with no harmful effects to the foods or to the people consuming such foods because the gas is rapidly given off upon ventilation and all traces have vanished long before the product reaches the consumer. In fact, the object of fumigating an industrial building is generally for control of insect infestation in the material, food products or other commodities stored therein. The building itself is merely serving as a large fumatorium.

During the fumigation period, any fumigant is absorbed in lesser or greater amounts by the product under fumigation, and in the case of certain fumigants actual chemical changes in the product may occur. Hydrocyanic aid (HCN) however, does not combine chemically with foodstuffs, and is not fixed permanently in the products under treatment.

While a certain amount of hydrocyanic acid is absorbed during fumigation, it is rapidly given off (desorbed) from the commodity during the aeration period, and after 24-72 hours aeration little or no HCN can be detected.

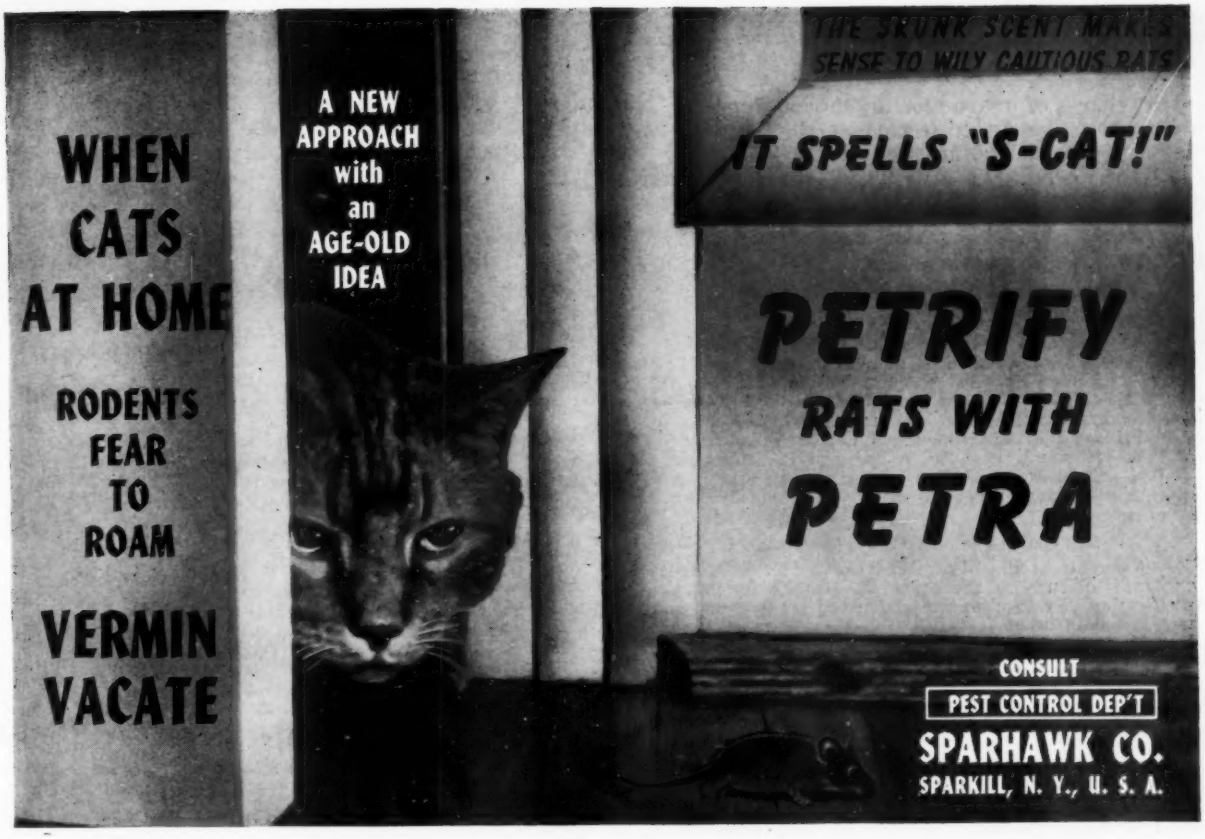
This characteristic, together with the high penetrability of the gas into commodities, which is absolutely necessary to effect a kill of insects or eggs deeply imbedded, makes HCN peculiarly adapted for the fumigation of food products.

Another advantage of paramount importance is that as HCN is desorbed rapidly from commodities, while this desorption process is going on during the aeration period, the released gas functions as a "post fumigant" and will effect a further kill of any insect stages surviving the initial exposure.

Certain precautions should be observed, however, when fumigating commodities carrying a high moisture or oil content, as with such commodities the desorption of HCN is slowed down, and the aeration period should be extended before releasing them for public consumption. As a safeguard the period of aeration under the most favorable conditions (ample air circulation and temperature not under 70° F.) should not be less than 72 hours.

Fresh fruits and vegetables should never be fumigated with the dosages of HCN used for dry food commodities.

—*Fumigation News.*


WHEN CATS AT HOME
RODENTS FEAR TO ROAM
VERMIN VACATE
A NEW APPROACH with an AGE-OLD IDEA
THE SKUNK SCENT MAKES SENSE TO WILY CAUTIOUS RATS
IT SPELLS "S-CAT!"
PETRIFY RATS WITH PETRA
CONSULT
PEST CONTROL DEP'T
SPARHAWK CO.
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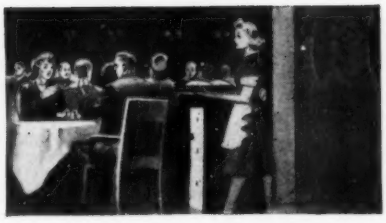


whenever insecticides are used

PENN-DRAKE

Insecti-sol

makes them float longer—kill more

Whether your insecticide is doing a "fighting job" at the front, or fighting pest sabotage on the home front—it will be effective longer and more stabilized if the base is Penn-Drake Insecti-Sol.

100% volatile—contains no harm ful ingredients to soil or stain delicate clothing, drapes, curtains, etc. Get the reasons YOU should specify INSECTI-SOL to build bigger sales for your insecticides—write Dept. 109 today.

MOTHICIDES
PENN-DRAKE ODOR-FREE NAPHTHA IS THE PERFECT BASE FOR MOTHICIDE PREPARATIONS

penn drake
petroleum products

PENNSYLVANIA REFINING CO.
GENERAL OFFICES · BUTLER, PA.

Makers White Oils (U. S. P. and Technical); Petrolatums (all grades and colors); INSECTI-SOL (deodorized insecticide base); Deodorized and other Naphthas; Petroleum Sulphonates; Waxes; Industrial and Motor Lubricants and Greases; Fuel Oils, and other petroleum products

Short Course of Instruction on Murine Typhus Control

A short course of instruction on Murine Typhus Control, sponsored under the direction of the Texas State Department of Health and assisted by the University of Texas and the U. S. Fish & Wildlife Service was held August 13-18, 1945, at the University of Texas, Austin, Texas.

The following program was given as outlined in the course.

MONDAY, AUGUST 13

9:00 A.M.—Registration—State Department of Health Office.
10:00-10:30 A.M.—Purpose of School and Objectives of the Typhus Control Program—Dr. Geo. W. Cox, State Health Officer.
10:30-11:00 A.M.—How to Present the Program—C. R. Coppedge, State Department of Health.
11:00-12:00—Visit to the Department and Laboratories.
2:00-2:30 P.M.—Mobile Units—Mr. Wilber and H. L. Draper.
2:30-4:30 P.M.—Class to be divided in sections on studying rat runs, baiting traps, dusting burrows, demonstration of equipment.

TUESDAY, AUGUST 14

8:00 A.M.—Assemble at the State Department of Health Office. Run traps—Return to the State Laboratory for combing, identification of rats, counting and identifying of ecto-parasites.
2:00-4:30 P.M.—Mixing and placing of poison.

WEDNESDAY, AUGUST 15

8:00 A.M.—Collect poisoned rats, identify species, also parasites.
10:30 A.M.—Inspection of rat-proofing shop.
2:00 P.M.—Inspection of rat-proofing installations.

THURSDAY, AUGUST 16

8:00 A.M.-5:00 P.M.—Meet at State Department of Health Office. Demonstration of dusters, spraying equipment, mixing of dust, DDT films, placing of dust in business establishments.

FRIDAY, AUGUST 17

Assemble at The University of Texas Engineering Building.
9:00-9:45 A.M.—Rat-proofing procedures, permanent rat stoppage, estimation, maintenance, shop requirements, materials—B. F. Hungate, USPHS (State), V. W. Bacon, USPHS (State), Howard Harris, USPHS (State), Bertram Giesecke, Austin, Texas.
9:45-10:30 A.M.—Education—Films, Posters, Placards, etc.—L. E. Bracy, Director, Public Health Education, State Department of Health and Peter G. Cranford, USPHS (State).
10:30-11:15 A.M.—Fumigation—Mr. Wilber, C. A. Trimbos, Pres., Texas Pest Control Association, or representative of the PCO.
11:15-12:00—How an Area May Establish its Eligibility and be Placed on the Approved List—Carl G. Stubbs, State Department of Health.
2:00-2:45 P.M.—Preparation of Project Proposal, Preparing Estimate—L. J. Trotti, Assistant State Director, Malaria Control in War Areas, State Department of Health and John Parker, MCWA, State Department of Health.
2:45-3:30 P.M.—Facilities that the State Department of Health and Cooperating Agency will Make Available to Towns, Cities and Communities on Cooperative Projects.
3:30-4:15 P.M.—The Employment of ANTU with DDT and the Research Phases of Typhus Control—Professor R .G. Upton, Nacogdoches, Texas.
4:15-5:00 P.M.—Assignment of DDT Dust where Eligibility has been Established—Dr. Geo. W. Cox, State Health Officer or associate.
5:00 P.M.—Round Table.

EVENING SESSIONS
THE UNIVERSITY OF TEXAS
ENGINEERING BUILDING

MONDAY, AUGUST 13

7:30 P.M.—Life History and Habits of Rats—H. J. Spencer, U. S. Fish and Wildlife Service.
Life History of Ecto-Parasites Found on Rats—Dr. D. V. Moore and N. M. Randolph, Bureau of Laboratories, State Department of Health and C. J. Rohde, USPHS, MCWA, (State).
Film.

TUESDAY, AUGUST 14

7:30 P.M.—Diseases Transmitted by the Rat—Dr. V. T. Schuhardt, The University of Texas.
Human and Rat Bloods—Demonstrations on How to Bleed—How to Transmit Specimens to the Laboratory—Dr. J. V. Irons and Mrs. T. Sullivan, Bureau of Laboratories, State Department of Health.
Film.

WEDNESDAY, AUGUST 15

7:30 P.M.—Statistics Necessary for a Typhus Program
(1) Morbidity
(2) Mortality
(3) Rat Density
(4) Ecto-Parasite Survey
Dr. S. W. Bohls, Director, Bureau of Laboratories, State Department of Health.
General Sanitation—Professor Jack Lenhart, The University of Texas.
Film.

THURSDAY, AUGUST 16

7:30 P.M.—Eradication Methods—Poisoning, Mixing of Bait, Placing of Bait, Financing of Poison Program—Grover C. Marshall, U. S. Fish and Wildlife Service, Assisted by Messrs. Jones, Strickland, Wm. Cox, and Sam Landrum.
Explanation of Various Forms Used, etc.—Pope A. Lawrence, USPHS (State), E. P. Willms, USPHS (State), V. W. Bacon, USPHS (State).
Round Table.
In Charge of General Program—Martin C. Wukasch, State Department of Health.
In Charge of Field Work—C. P. Humphrey, State Department of Health with C. P. Fore, Austin-Travis County Health Unit, Assisting.
Consultants to the Course:
Dr. David E. Davis, Ph.D., USPHS (State) on research and techniques.
Dr. Asa C. Chandler, Special Consultant, MCWA, Aedes aegypti Section.
Mr. C. R. Landon, Fish and Wildlife Service and associates on Poison.
Mr. Price Griffith, Ft. Worth City Health Department.
Mr. William Cox, Ft. Worth City Health Department.
Mr. L. J. Ogden, USPHS (State) on Entomology.
Mr. C. R. Coppedge, State Department of Health on Organization of Programs.
Dr. Tracy I. Storer of the Rodent Control Subcommittee, Office of Scientific Research and Development.

Fumigator's First Aid Kit

Now available—a Fumigator's First Aid Kit containing the cyanide antidote described in a recent pamphlet issued with a previous news bulletin—the pamphlet entitled—"The Modern Treatment of Cyanide Poisoning" by Chen, Rose and Clowes of the Lilly Research Laboratories, Eli Lilly & Company, Indianapolis, Indiana.

The above antidote is contained in a separate, sealed compartment in the kit and consists of two 50 cc ampules of sodium thiosulphate, two 10 cc ampules of sodium nitrite, one 50 cc sterilized syringe and needle and one 10 cc sterilized syringe and needle.

On the outside of the special sealed compartment containing these items is a warning reading—"ANTIDOTE—CONTENTS FOR USE BY PHYSICIAN ONLY". On the inside of this special cover will be found complete detailed information for the physician—recommended procedure in applying the antidote.

Another compartment of the kit contains small individual packages as follows:

Amyl Nitrite Pearls	Gauze Compress
Iodine Applicator	Triangular Bandages
Adhesive Plaster	Adhesive Absorbent Compress
Gauze Bandages	Ammonia Inhalants

The inside cover of the kit contains fumigation safety rules, general first aid procedure and the Prone Pressure Method of resuscitation.

The price of the kit may be had by writing direct to American Cyanamid & Chemical Corporation, Insecticide Department, 30 Rockefeller Plaza, New York 20, N. Y.

Every PCO who engages in cyanide fumigation should have a sufficient number of these kits so that he can have one on each job—ready for the physician in case of emergency. Then, if anything happens, the man on the job immediately starts the Schafer Prone Pressure Method on the patient while someone else puts in a call for the physician. Thus, when the physician arrives, the kit is at his immediate disposal.

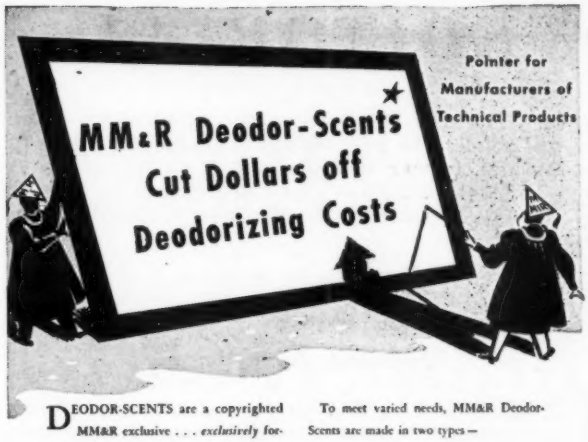
PEST CONTROL MEN *Can Speed Up Their Work with* ACME FULL VISION GAS MASKS

After many years of testing experience, Pest Control Operators have found that the Acme No. 4 FULL VISION All-Purpose Gas Mask definitely aids in speeding up their work. The Lenses in Acme Gas Masks DO NOT distort the vision, as they are made of Flat, Wide Safety Glass.

The Acme Gas Mask and Canister provides protection against any fumigating gas, or combinations of gases. Write for descriptive literature and prices.

BUY WAR BONDS OFTEN

ACME PROTECTION EQUIPMENT CO., INC.
Manufacturers of Respiratory Protective Devices
3616 LIBERTY AVENUE PITTSBURGH PA



Pointer for Manufacturers of Technical Products

DEODOR-SCENTS are a copyrighted MM&R exclusive . . . *exclusively* formulated to cover the odors of ingredients used in fly sprays and other technical products.

With MM&R Deodor-Scents, every trace of undesirable odor is removed positively and permanently, and at a cost so low you'll marvel at their extraordinary efficiency.

To meet varied needs, MM&R Deodor-Scents are made in two types—

Type A—*To Neutralize and Perfume*
Type B—*To Neutralize Without Perfuming*

If possible, send us your unperfumed product, and we will return "Deodor-Scented" samples. Deodor-Scents for testing on request.

Magnus Means Reliability

**It's not a Deodor-Scent if it's not labeled MM&R*

MAGNUS, MABEE & REYNARD, INC.
SINCE 1895 ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS
16 DESBROSSES STREET, NEW YORK CITY • 221 NORTH LASALLE STREET, CHICAGO
Los Angeles: Braun Corp. • Seattle, Portland, Spokane: Van Waters & Rogers, Inc.
San Francisco: Braun-Knecht-Heimann Co. • Canada: Richardson Agencies, Ltd., Toronto

Larvacide
CHLORPICRIN

DESTROYS RODENTS WITHOUT CARCASS NUISANCE

- ★ Light, economical dosage
- ★ Easy application
- ★ Powerful, killing gas penetrates retreats, driving rats out to die on the open floor where carcasses are easily swept up
- ★ Positive warning cuts accident risk
- ★ Write for further information...NOW!

Larvacide—tear gas fumigant—comes as liquid—cylinders 25, 50, 100 and 180 lbs.—also handy 1 lb. Dispenser Bottles, each in sealed can, dozen to case. Stocked in principal cities.

INNIS, SPEIDEN & CO., 117 Liberty St. NEW YORK 6
BOSTON • CHICAGO • CINCINNATI
CLEVELAND • OMAHA • PHILADELPHIA

Now Available for Immediate Delivery

Ce-Co Mouseseed

STRYCHNINE-TREATED, ANISE-SCENTED IMPORTED CANARY SEED

100 lbs.	$28.00
50 lbs.	15.00
25 lbs.	8.00

F.O.B. N. Y.

With leading pest control firms CE-CO STRYCHNINE-TREATED MOUSE SEED is a must for mouse control.

A trial order will convince you.

Ce-Co Exterminating Products Co.
877 FULTON ST., BROOKLYN 16, N. Y.

EDITORIAL

(Continued from Page 5)

the war. The day is coming when many of these same men will ponder the past. Many of these same men will lament their former attitude and the lack of interest shown to their customers and will wake up to find that they have lost out because of their foolhardy way of doing business.

Let's render satisfactory services.

Unsound Advertising

TO THE PCO baffled by the complexities of what is sound or unsound advertising—the difference isn't always as apparent as one might surmise—two recent analyses offer the best orientation yet presented.

The first discusses the results of a survey by the National Better Business Bureau, Inc. (New York) among its members. In it Edward L. Greene, general manager of the Bureau, declares:

"All the Bureau members who have written us . . . agree that the real responsibility for unsound advertising is on the advertiser. Practically all concur in the idea that an ad can do five selling jobs: for the goods, the company, the industry, advertising and American business. Of course, an ad can be good without doing all these jobs. But advertising is unsound if it unsells the public in any respect, no matter how beautiful may be its color photography or how entertaining its show or how imperishable its slogan—and no matter how much goods it sells.

"We're talking about advertising as a public expression of business—probably the most important. An ad may be technically perfect, but if it is selling a harmful product or fake stocks, it is obviously unsound. These letters are not concerned with the advertising of unsound merchandise but with the unsound advertising of good, honest products.

"What is unsound advertising? The advertising which is out-and-out deceptive and fraudulent is obviously unsound. The unsound advertising which is not obvious is the most difficult to define and almost impossible to stop with laws and commissions and courts. Yet it is the type of advertising which does the most harm. Business and advertising have reached that stage in their economic development where to step over the line of the law is dangerous but it may be even more dangerous to step over the line of public opinion because it stirs the resentment of so many more accusers.

"Worst of all such unsound advertising is the kind which is so carefully and skillfully written with one eye on all laws and regulations that the advertiser can claim it is literally truthful. The words are clear—but somehow the reader gets a different impression and it happens to be one of advantage to the advertiser. Such advertising gives the victim opportunity and encouragement to fool himself—it is planned that way.

"Another kind of unsound advertising flaunts exaggeration and gush. These seem harmless enough; after all, even the law does not wholly condemn a certain amount of self-praise and puffery. But how far can exaggeration go before it becomes deception? How far can puffery go before it undermines public faith in advertising? The plea that 'Oh, well, the public expects advertising to be exaggerated' is meant to be reassuring—instead it is the most frightening condemnation of advertising and the future it is making for itself.

"The advertising which offends public taste is, of course, a 'matter of taste' and its effects vary with different people and at different times. What may seem offensive to one may raise no eyebrow in another. But that does not mean that 'you can't please everyone' is a good reason for offending anyone. The few who are offended by this ad; the few who are offended by another and another—these few make up the public. The question of public taste becomes all the more important with the use of national mass media for advertising—the bigger the public, the bigger the responsibility to it.

"Another kind of unsound advertising is the critical competitive type. But can there be competition without it? Some advertisers are still convinced that there cannot—at least for them. The advertising which knocks competition is knocking itself; it stirs retaliation and starts a descending spiral of claim and counter-claim. That is one reason why, within each industry, competitors must be careful of the front they put up to the world. The "you're another' kind of competitive advertising not only confuses the public mind, but also helps to set it against advertising in general. It tends to make the frustrated public receptive to extreme criticism of advertising and to panaceas for its regulation. Before the war there were still plenty of advertisers who aired their industry's dirty linen as though they were the boys raising the flag at Iwo Jima. Will there be more of this after the war?

"These are some of the main types of unsound advertising. Of course, the volume of sound advertising is far greater than that of unsound advertising. True—and the neck is bigger than the boil and the eye is bigger than the sand-speck."

The second is an extract from Service Letter No. 334, in which the "National Pest Control Association classifies the following as objectionable within the meaning of the Code of Ethics, and disapproves their use in advertising copy. It considers these not essential to effective advertising, and believes that the best interests of the Industry and of the Public will be served by their voluntary curtailment and eventual elimination":

1. **UNDUE EMPHASIS ON "GUARANTEES"**
   (When 'guarantees' are given prominence comparable with that given the service itself which we have to sell, the effect can only be to invite similar excesses and to undermine the public confidence in our industry.)
2. **RELIANCE ON SUPERLATIVES.**
   (Superlatives are seldom justified in fact. Their use signifies mainly, poverty of ideas. 'Biggest', 'best', 'only', '100%', 'largest', 'positively', etc. are challenges to bigger and better superlatives, and have the net effect of degrading both the advertising and the Industry in public opinion.)
3. **MENTION OF 'U. S. GOVERNMENT'.**
   (Reference to the 'U. S. Government' seems solely for the purpose of implying, however indirectly, governmental endorsement of materials, methods or organizations. Government agencies never endorse nor authorize 'testimonial' copy. Violation of this known desire is clearly 'tricky', and a breach of faith.)
4. **EMPHASIS ON CHEAPNESS.**
   (The terms 'Cheap', 'Lowest Prices', and others emphasizing the idea of 'cheapness', serve only as propaganda for price buying and price service; essentially suicide. A similar effect is fostered by the featuring of 'free' services. Emphasis is much better placed on **economy** of good service.)
5. **MISSTATEMENT OF PCO EXPERIENCE.**
   ("Examples: '25 years in Blank City'—Actually signifying length of residence there; in Pest Control business a much shorter period. '15 years experience'—when this 'experience' has been other than as a bonafide PCO. Such statements, besides misleading the public, are grossly unfair to established firms, who have every legitimate right to feature their years established.)
6. **UNSUPPORTED TECHNICAL STATEMENTS.**
   (Statements of fact in matters of chemistry, entomology, etc. which are not acceptable to recognized **non-commercial** authorities on these subjects. This includes quotation of such unsupported statements or claims, which may originate with manufacturers of supplies or proprietaries.)
7. **EXTRAVAGANT CLAIMS OF RESULTS.**
   (Claims as to speed, completeness and permanency of results, not justified by the facts of practical, everyday pest control operations. Examples: 'positive results in 3 hours', 'only one application needed', 'not one failure in 8 years'.)

Notice

For the past several months, we have been receiving many requests for back issues, and our regrettable replies were "out" due to heavy demand for back issues.

May we take this opportunity to state that unless those whose subscriptions expire respond immediately to the expiration notice sent them, we cannot guarantee to supply any issues missed by the delay in renewing.

May we again emphasize, please renew when notice is received.

How to Prevent Damage From Moths

USE

SOLVAY
PARA-DICHLOROBENZENE

- Para-dichlorobenzene, properly used, is recommended by the U. S. Dept. of Agriculture as an actual moth killer.
- Kills moth larvae and also deodorizes as it prevents moth damage.
- Write for complete folder containing simple, easy-to-follow instructions. Prices for 100 and 200 lb. drums on request. Write today to Dept GA-6.

SOLVAY SALES CORPORATION
Alkalies and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street New York 6, N. Y.

for

TERMITE

Control . . .

DRY SODIUM ARSENITE

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Local Organization News

Central New York State Operators

The first get-together of the pest control operators of Central New York State was held at Albany, N. Y. on Monday, July 30th. Walter Blank of the Abalene Pest Control Service was host and made available his office for the meeting. The occasion was the visit of Secretary "Bill" Buettner of the National Pest Control Association who led in a discussion of over-all problems confronting the operators in that section of the state.

Legislation was discussed but decision reserved pending a report that it is expected will be made by the Legislative Committee of the NPCA. The number of accidents and type of operations especially in regard to cyanide fumigations came in for much attention. Decision was made to hold future meetings which it is hoped will lead to the formation of an organization for operators in the central part of the state. It was unanimously agreed that Dr. Charles Palm be contacted to the end that a two days' meeting might be held later this year at Ithaca, N. Y. with emphasis on chemistry of insecticides.

Those in attendance included: Leon Moore of Utica, N. Y.; George Dummitt and I. B. Carncross of Syracuse, N. Y.; William MacLachlan of Mechanicsville, N. Y.; Harry Linnondoll, E. G. Bailey, Mrs. A. Alberts, Miss M. Conroy, Carl Denhke, and Walter Blank of Albany, N. Y. Dave Weisburger of New York City also paid a visit during the course of the meeting to discuss matters of insurance.

INSECT REPELLENTS: Development by entomologists of the Bureau of Entomology and Plant Quarantine of insect repellents effective against mosquitoes and chiggers, and to a lesser extent against wood ticks, is announced. These repellents, which include dimethyl phthalate, have been used by the allied armies since 1942, but are not yet available for civilian use.

CHICKEN THIEVES AGAIN USE GAS: Willmar, Minn., July 21 (AP) — Chicken thieves who use gas to do their work silently have struck a second time near this community, taking several hundred springers from the farm of Hilding Hawkinson. Mrs. Hawkinson, aroused by a dog's barking, went to the chicken house to investigate and apparently frightened the thieves away. About 600 chickens were left dead on the floor. —*N. Y. Sun.*

Wanted: One or Two Copies "Our Enemy the Termite"

If you are the owner of a copy of Dr. Thomas E. Snyder's book of the above title and would like to dispose of it, won't you kindly contact William O. Buettner, secretary of the National Pest Control Association, 3019 Ft. Hamilton Parkway, Brooklyn 18, N. Y., at year earliest convenience? You will be paid $4.00 for your copy—or $1.00 over the original publication price. You are assured, if any assurance is necessary, that the books will be used to further the best interests of the Industry.

WHAT'S NEW IN PEST CONTROL-PERSONALS

LIEUT. (S.G.) H. E. JENNINGS, owner of the Smithereen Co., Inc. of Chicago, who has been in service for over two years has been promoted to Lieut. Commander. He is now Lieut. Commander H. E. Jennings.

MARRIED: RAY KENDRICK PARKS, manager of Orkin Exterminating Company's office at Tallahassee (Florida), was married to Miss Pearl Elizabeth Garst on July 28th at Thomasville, Ga. Congratulations, and we wish you all the happiness in the world.

RODDA JOINS DODGE & OLCOTT: Mr. John A. Rodda, whose resignation from the War Production Board after two and one-half years' service as Chief of the Insecticides and Fungicides Unit, Chemicals Section, was recently announced, has accepted a position with Dodge & Olcott, Inc. where he will serve as Assistant Manager of their Insecticide Department and in charge of sales.

Prior to his service with the War Production Board, Mr. Rodda had broad experience in the insecticide business for thirteen years, initially with McCormick & Company, and later with the Mechling Chemical Company Division of General Chemical Company. Dodge & Olcott, Inc. was recently purchased by U. S. Industrial Chemicals, Inc. Their Insecticide Department which originally comprised only pyrethrum and rotenone materials has been expanded to include a number of new synthetic organic insecticides and insect repellents.

THE OHIO EXTERMINATING CO., INC., of Columbus, announces the opening of a new store and office at 1343 North High Street, in same city. Best of luck, Mr. Christman, in your new quarters.

OBITUARY: FREDERICK CHARLES RENNER, general manager of sales, Organic Chemicals Division, Monsanto Chemical Co., St. Louis, Mo., died on June 26 after an illness of several months.

BORN: TIMOTHY ALFRED KING, arriving on May 30, is now a member in good standing in the York A. King, Jr., household. Dad is with the Rose Exterminator Co. of Philadelphia. Congratulations.

NOW WE'VE HEARD EVERYTHING: A PCO was around with a puffed-up eye, not yet black, and he insisted he was eating in an outdoor restaurant and got the injury from an insect. The natural response is, "Yeah, what was his name?"

ROBINSON ORD APPOINTED GENERAL MANAGER OF SALES FOR MONSANTO CHEMICAL COMPANY ORGANIC DIVISION: Robinson Ord, of St. Louis, has been appointed general manager of sales of the Organic Division of Monsanto Chemical Company, it was announced on July 27 by Osborn Bezanson, vice president and general manager of the Organic Division. Ord, formerly an assistant general manager of sales, succeeds Fred C. Renner who died on June 26.

Other promotions announced at the same time include Arthur P. Kroeger, of St. Louis, who has been appointed an assistant general manager of Organic Division Sales and Charles H. Sommer, Jr., of St. Louis who will assume responsibility for sales of intermediates as well as plasticizers and resins.

UNLICENSED TERMITE OPERATOR IS FINED: H. C. Blankenship of Blytheville, Ark., charged with operating a termite control business without license, pleaded guilty and was fined $10.00 and costs in Justice of the Peace Court at Rector on June 13th, according to an announcement by the Arkansas State Plant Board, Little Rock.

TRY TO CHECK POLIO: DDT, the insecticide that fought disease-bearing bugs in the war, was sprayed on Rockford, Ill., by airplane on August 19th in the community's fight against an infantile paralysis outbreak.

DDT had been sprayed along gutters and roadsides from trucks as part of a research program but health officials sought use of an Army plane to provide more thorough coverage. A B-25 bomber, supplied by the Air Technical Service Command in Dayton, Ohio, carrying equipment originally tested for mosquito control in Panama, was used. Dr. John R. Paul, Yale University authority on polio control, supervised the experiment, according to Wright Field.

THIS CLASSIC concerns a lazy PCO—if there be such. He didn't like to hurry home at midnight to exercise his dog. Observing that the dog ran excitedly when the phone rang, he began phoning home at midnight and letting the phone ring four times. Thus Fido got exercise.

He boasted of his ingenuity to his friends. Next time when he called, "the dog" took the receiver off the hook and cheerily answered the phone with a loud "Woof, woof, woof!" The PCO dashed home to investigate his telephoning dog.

ANT ODYSSEY

Ants in safari pass
Through a jungle—grass
And weed. They gaze upon
A Congo or Amazon
Where the echoing drain
Empties, after rain.
Saharas of backyard dirt,
Forming caravan, they skirt
Andes of unharrowed clods
Where defeat is given odds
At victory gardening; advance
To where anathemas of ants,
Artful spider, fatal toad,
Have a camouflaged abode:
Through dread lizard country press
Their minutiae of progress—
Viewing at last the hills of home
Rising in the native loam.

—Andrew Hewitt.
From The N. Y. Herald Tribune.

CHICAGO TO GIVE SLUMS 30,000 GARBAGE CANS: Chicago, July 20.—The City of Chicago is going to give away 30,000 garbage cans to families in the slum areas to help clean up the city and combat the garbage and rat nuisance.

Mayor Edward J. Kelly said that he had directed the Department of Public Works to buy the cans at a cost of not more than $4.50 each.

He added that the free distribution of the garbage cans will be an experiment to help

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Plant and Laboratories: Bayonne, N. J.

determine whether that will help "to cut down the cost of garbage collection and, at the same time, clean up alleys and eliminate dirt and rats."

From The N. Y. Herald Tribune.

DDT may be obtained for experimental purposes in accordance with paragraph (f) of the General Chemicals Allocations Order, M-300. Before obtaining such material, the customer is required to submit an end-use certification, stating the nature of the research involved.

WPB warned that if DDT "leaks out" for any but strictly experimental purposes where research is conducted by competently trained personnel, it may be necessary to place the insecticide under full allocation control, requiring substantially more paper work by both industry and Government.

BRITISH FIND SUPER-DDT: By Science Service, Boston, Mass.—A super-DDT, a synthetic compound even deadlier than the original DDT, has been discovered by British chemists. It is called Gammexane, and is sometimes referred to by the Apocalyptic number 666. Its exact chemical designation is the gamma isomer of benzene hexachloride.

It is not particularly closely related to DDT in its structural chemistry, but it seems to be even more of a knockout so far as insects are concerned, a report by A. D. Little, Inc., states. Its history is like that of DDT in that its existence had been known for a long time, but its insecticidal properties had not been suspected until it was tried out fairly recently. Then it was discovered to be the deadliest weevil poison that the British firm's chemists had ever tested, and it would kill flies in half the concentration required in a DDT solution. It was also proved to be deadlier than DDT to Aedes egypti, the mosquito that carries yellow fever.

There are, however, some points about Gammexane that have not yet been cleared up. It is not known, for example, whether it is as persistent under conditions of ordinary use as DDT, which is known to remain toxic to insects for months. Lime, which is used a great deal in agricultural sprays and dusts, is known to be destructive to Gammexane; how to obviate this difficulty has yet to be worked out.

Gammexane is not yet commercially available in the United States, but presumably will eventually appear in the market here.

Complete story on Gammexane appears elsewhere in this issue.—Ed

MOSQUITOES BEAR ENCEPHALITIS: One of the more common American mosquitoes has been found guilty of carrying encephalitis, popularly known as sleeping sickness, "The Journal of the American Medical Association" reported on August 17. Four West Coast investigators reported the results of their study of annual encephalitis epidemics in the Yakima Valley of the State of Washington. The scientists, W. McD. Hammon, M.D.; W. C. Reeves, Ph.D., and Bernard Brookman, A.B., all of San Francisco, and S. R. Benner, M.D., of Yakima, said that the epidemic's peak is normally reached during the middle and latter part of August, slightly after a similar peak in the activity of the culex tarsalis mosquito.

—N. Y. Herald Tribune.

AND NO RED POINTS NEEDED, EITHER—The 17-year locust, or Cicada, emerged in many eastern gardens and woodlands during June. The insect is prized highly as a food by a few venturesome humans. When fried or boiled in a milk stew, this insect's flavor is said by some to excel that of oysters or shrimps.

AVAILABLE PATENTS LISTED—Some 45,000 United States patents of German, Japanese, and Italian origin are listed by the Alien Property Custodian for examination. Licenses under most of these are now available to United States citizens for an administrative fee of $15 per patent. They cover practically every field of mechanics, electricity, and chemistry, and have been divided into 312 general groups for convenience. The chemical patents and patent applications have been summarized and digested, a complete set being available for $25 through the Office of Alien Property Custodian, Chicago 3, Ill. Copies of the actual patents may be seen at Field Bldg., Chicago; 120 Broadway, New York; 17 Court St., Boston; National Press Bldg., Washington, D. C.; and Guardian Bldg., Portland, Oregon.

ANALYZES VET EMPLOYMENT—Research Institute of America has issued analysis No. 38 on "Rehiring Your Company's Veterans," which is available free of charge from the institute's public relations department, 292 Madison Ave., New York. The analysis covers employers' legal responsibilities toward veterans, unions and veterans, personnel policies for veterans, employing disabled veterans, and excerpts from Selective Service legislation on the subject.

PYRETHRUM—Yields from experimental plantings of pyrethrum in Ceylon have been satisfactory, according to recent advices. One plot of 50 acres was planted in the Nuware Eliva district by the Department of Agriculture. It was stated that the industry is being expanded.

BODY LOUSE TOXICANT—It is reported that sesame oil and ethylene glycol ether of pinene increase the toxicity of pyrethrum as much as 100 times against the body louse.

—Inside News.

DDT IN PAINT—Two British paint chemists suggest that DDT, the potent insecticide, mixed with interior paints and wall finishes, will rid houses of flies and other pests. Tests have proved the practical value of the experiment, according to Inside News.

GOVERNMENT PUBLICATIONS

Tests of DDT Against Insect Pests of Stored Seed, Grain, and Milled Cereal Products. R. T. Cotton, J. C. Frankenfeld, H. H. Walkden, and R. B. Schwitzgebel. E-641. 7 pp. Processed. U. S. Dept. of Agriculture, Washington, D. C.

Preliminary Tests of Synthetic Organic Compounds as Insecticides. Part 2. M. C. Swingle, J. B. Gahan, and A. N. Phillips. E-634. 23 pp. Processed. U. S. Dept. of Agriculture, Washington, D. C.

ADVICE ON BEE STINGS: Many do not know what to do when stung by a bee, entomologists report. Bees working on flowers rarely sting unless a person picks up the bee. It is only when you go too near the nest, they say, that a bee may attack you. In case of a sting by a honeybee, the best treatment is to scrape out the sting at once with your fingernail. Do not run for help, the bee experts say, or try to pull out the sting. That causes more venom to work into the wound. If attacked by either honeybees or wild bees, the best protection is to cover hands and face, and leave promptly to avoid too many stings. But, as soon as possible, stop and scrape out all the stings.

OFF-GRADE PYRETHRUM CONTROLS EASED: Allocation controls of off-grade pyrethrum not found suitable for military use have been relaxed, according to a recent War Production Board announcement. These supplies of pyrethrum are now under paragraph (f) of M-300, with purchase of the material permitted for food-processing plants and for structural pest control service. Formal allocation forms are not now necessary, the consumer merely certifying end-uses. Continuing in short supply and still under severe control, are the better grades of pyrethrum, rotenone and DDT. Consideration is also being given to similar relaxation of end-use restrictions on rotenone that now apply on pyrethrum.

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II. Plants as Housepests. Bacteria. Molds which live in the house. Timber rot, fungus. What plants do to housepests and what housepests do to plants and plant products. Pages: 62.

III. Lower Animals. Protozoa, worms, snails, millepedes, spiders, mites, many others, as far as they are housepests. Pages: 112.

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RATS CAN'T RESIST THE NEW BAIT

as effective as the best beef

Simply add water—boil up once—add poison—and it works like magic. Keeps indefinitely—needs no refrigeration. Safe to use.

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FOR ROACHES and RATS

SINCE 1874

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Guaranteed Killing Power

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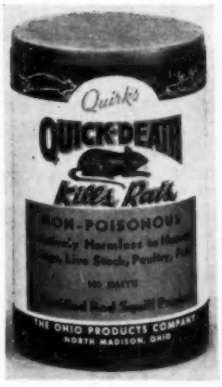

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The book "Spray Chemicals and Application Equipment" is divided into two parts. Part one gives the interesting historical background of many chemicals and detailed discussions and photographs showing how they are manufactured. In addition, much discussion is devoted to methods of using spray chemicals, to insects and diseases controlled by the specific chemicals, and to methods of improving present day pest control practices.

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"SKUNKADORA" . . . DEODORANT

Most, if not all, PCOs have at one time or another wrestled with the problem of eliminating the odor of a dead rat wall-trapped. A simple method to eliminate such an odor, it is stated, is to use Skunkadora, application of which is easy. One merely, we are informed, unscrews the cuff of the electrical fixture nearest the spot where the odor is noted. This displays an iron box in which the wires are coiled. An open space between it and the plaster wall is left. By inserting the nozzle of the sprayer in this aperture, the Skunkadora can be forced behind the partitions and through the space where the dead rat lies. Since the spray will sink down and reach the body, as soon as it comes in contact all odor ceases. This action is active as long as any smell of decomposition persists, it is stated.

WRITE PESTS—SPARKILL.

NEW EDITION FUMIGATION MANUAL NOW AVAILABLE

The new edition of the Fumigation Manual pertaining to the use of Aero Brand HCN Discoids is now off the press. Every PCO should have one on hand as it is a ready reference and contains helpful and valuable information and suggestions.

WRITE PESTS—A-C MANUAL.

ODORLESS DEODORANT—This all-purpose home and commercial deodorant, it is stated, kills odors by absorption, not by superimposing another odor. It is also stated to be non-toxic, non-poisonous, non-caustic, non-inflammable, non-corrosive and harmless to man, animals and birds. Effective in the elimination of offensive odors.

WRITE PESTS—X-ODOR.

RAT GLUE AND BOARDS CIRCULAR

RAT GLUE AND BOARDS CIRCULAR discusses use of rat glue boards as a means for effective rat control, etc.

WRITE PESTS—ELKAY.

TERRATOX CONCENTRATES

Circular depicts damage by termites, Lyctus Beetles and decay and the value of Terratox Concentrates as a means of control. Price list also included.

WRITE PESTS—TERRATOX (W).

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INSECT TRAPS

Bulletins describe traps for ants and roaches, with suggestions for their use.

WRITE PESTS—SOILICIDE.

FUMIGATORS EXAMINATION

Analysis of examination papers from a written examination taken by a number of PCO's and others who attended a school on insect and rodent control are contained in this news bulletin. Bulletin also publishes a list of questions people ask PCO's about Cyanogas and the answers thereto.

WRITE PESTS—A-C91.

THE MODERN TREATMENT OF CYANIDE POISONING

This brochure, written by KK. Chen, M. D., Charles L. Rose, B.A., and G. H. A. Clowes, Sc.D., and reprinted from the Journal of the Indiana State Medical Association, discusses The Modern Treatment of Cyanide Poisoning. Contents include: Sources of Poisoning and Mortality Statistics; Diagnosis; The New Treatment; A Suggested Procedure for Actual Treatment; Results to Date, etc.

WRITE PESTS—A-C CYANIDE.

PYRETHRUM - DERRIS - RED SQUILL PRODUCTS

Leaflet describes foregoing insecticides with special bait chart for use in connection with powdered red squill.

WRITE PESTS—PRENTISS.

CONTROL OF TERMITES-POWDER-POST (LYCTUS) BEETLES-DECAY

Circular discusses properties and uses of Permatox A in termite control and its application to soil and wood to control termites, decay control, powder-post beetle prevention and control. Description of Parmatox T and its uses in termite control, as a soil poison, are also discussed, together with toxicity.

WRITE PESTS—BULLETIN 43-T.

VICTOR GLADIATOR METAL RAT TRAP

The Victor Gladiator Rat Trap is made of 22 Gauge Steel, Gun Metal finish. Equipped with strong double-coil spring made of 15 gauge oil tempered spring wire. heavy wire work throughout. Note holes in base for nailing to floor, rafters, or wall.

The Victor Gladiator has been designed especially for professional use by public health officers, sanitary officers of the armed forces, and pest control operators. It is of rugged construction and is particularly adapted to outdoor use; especially recommended for the tropics and on shipboard, not readily affected by continuous contact with moisture.

Actual size 7⅛x3⅝x½". Weight, packed 1 dozen, 4½ lbs. Weight, packed 6 dozen, 29½ lbs.

WRITE PESTS—VICTOR.

PRESERVATION OF MILLWORK AND OTHER DRY WOOD PRODUCTS

Bulletin discusses composition of Permatox B Concentrate and its application in the preservation of millwork and other dry wood products.

WRITE PESTS—PERMATOX 43-B.

ADVERTISING IS NEWS

Never before have PCO's looked so eagerly to advertising for information, whether it seeks to produce sales, build good will, give advice on the use and care of the material advertised in Pests—or whatever advertisers have to offer to PCO's, your advertising is news. And the most natural and effective place to reach PCO's is PESTS . . . the primary source of information for PCO's.

A GOOD JOB DONE

PER-MO-BITS

Scientifically Prepared For

RATS-MICE-MOLES

Made with tested Red Squill

A product that is effective, dependable and ready to use.

Safe to use—non-poisonous to humans, pets, domestic animals, etc.

A try sample size for $1.00—send for one today.

Packed 8 oz., 16 oz. or bulk.

4 to 1 Concentrate FOR RATS AND MICE

(Just Dilute With Water)

Per-Mo Rat and Mice Liquid can be used as a drink or can be mixed with any food and used as a bait.

ECONOMICAL TO USE

Send $1.00 for a 16-oz. Bottle CONCENTRATE RAT & MICE LIQUID. Postage Prepaid.

PENETRATE—

YOUR TERRITORY WITH THE

MOTHPROOF LIQUID THAT "PENETRATES"

Now that woolen conservation is so vital to "UNCLE SAM'S" war program, there is still greater need for Moth protection. You can help "America" protect its valuable woolen materials by selling "PER-MO" Mothproofing Service. Full particulars and prices first letter.

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Organic Insecticide for Crawling Insects

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6. Ideal for packagers of "Roach Powders" or for service work against roaches, bed bugs, ants, silverfish.
7. Offered to you only after our customary careful laboratory and field studies, including months of practical trial by numerous Pest Control Operators.

PYRISCENTS—If you have a perfuming problem, investigate these specially compounded insecticide perfumes. Pyriscents are available in many odors and are completely oil soluble.

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JOHN POWELL & CO.

One Park Avenue

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Inquiries invited from pest control operators interested in New Big 6 Line of Wizo Moth Killer Vaporizers and Crystals. Catalog describing each product fully and prices available.
WRITE PESTS—ELKAY.

FILM OF VALUE TO PCO

Circular describes a vivid action film of greatest value to every PCO and opportunities it affords PCO to build good will and better public relations.
WRITE PESTS—WIL-KIL.

ANT BAIT

Circular describes a jelly ant bait with Thallium Sulphate as its toxic ingredient. Comes packed in sizes convenient for resale or professional use. Sample tube on request.
WRITE PESTS—LETHELIN.

Phosphorous Paste killing power; baits, combinations, amounts for the control of roaches, mice, rats are discussed.
WRITE PESTS—OPITZ.

FUMIGATION SAFETY RULE

A review of fumigation accidents of record for 1943 shows that oversight or disregard of rule to lock all doors and accessible windows, failure to place warning signs thereon and failure to post guard during fumigation account for approximately 20% of the accidents. Bulletin discusses ways and means to eliminate accidents of this nature.
WRITE PESTS—AC No. 80.

Fortified Red Squill circular, which includes bait chart, describes a Fortified Red Squill powder activated and standardized to meet recommendations of the Fish & Wildlife Service for a minimum lethal dose of 500/600 mg/kg of rat.
WRITE PESTS—PRENTISS.

SODIUM SILICO FLUORIDE

Bulletin describes sodium silico fluoride product with proper density. Effective manner of testing for presence of HCN after ventilation also discussed.
WRITE PESTS—AC 70.

Fumigation manual. 76-page manual describes safe handling and working with "Cyanegg" and on fumigation procedure and insect control. Illustrated.
WRITE PESTS—DuPONT.

GAS MASKS—RAT CONTROL PROGRAMS

Bulletin offers some pertinent suggestions regarding gas masks and how to keep them in perfect condition. It also discusses rat control programs and what the PCO can do to further them.
WRITE PESTS—AC 82.

WIZO
RAT GLUE BOARDS

Eliminate Use of Poison!
Require No Bait!

A practical and economical way to rid buildings of rodent pests! No hazards of poisoned bait . . . or of decomposition! Easy to prepare! Just place WIZO Rat Boards near rat hole or form a runway next to walls. Fasten boards to floor to prevent pulling away. Rodents are caught firmly the moment they step on the boards.

WIZO RAT GLUE can be obtained in quantities for preparing your own boards. Write for complete particulars.

ELKAY PRODUCTS CO.
323-27 West 16th St. New York, N. Y.

INDUSTRIAL CHEMICALS AND SPECIALTIES

This descriptive booklet lists the industrial chemicals and specialties manufactured by the Pennsylvania Salt Mfg. Co., which include DDT, grain fumigant, household and industrial sprays, etc.
WRITE PESTS—Pennsylvania.

METHYL BROMIDE FOR INFESTATION CONTROL

Reprint of an article by J. Carl Dawson which discusses insect control in the flour mill and warehouse with methyl bromide. Illustrated.
WRITE PESTS—DAWSON.

FUMIGATOR'S FIRST AID KIT

Now available for purchase by the PCO is a fumigator's first aid kit containing a cyanide antidote. Every PCO who engages in cyanide fumigation should have a sufficient number of these kits so that he can have one on each job—ready for the physician in case of emergency. Then, if anything happens, the man on the job immediately starts the Schafer Prone Pressure Method on the patient while someone else puts in a call for the physician. Thus, when the physician arrives, the kit is at his immediate disposal.
WRITE PESTS—A-C 93.

FOR EXTERMINATING RATS AND MICE

Circular describes prepared Red Squill baits, which, it is stated, will save time of your service men and is economical to use. . . . Information also furnished on strychnine-treated, anise-scented mouse seed.
WRITE PESTS—Ce-Co.

METHYL BROMIDE APPLICATORS AND SUPPLEMENTARY EQUIPMENT

Profusely illustrated this booklet describes applicators for one-pound cans of methyl bromide; applicators for use with cylinders; application of methyl bromide by direct weighing of cylinders; tubing and piping; piping system for mill and warehouse; sealing materials; fans; tarpaulins; safety equipment; Halide Leak Detector; safety suggestions, etc.
WRITE PESTS—APPLICATORS.

Red Squill Rat and Mouse Killer

Booklet describes Red Squill rat and mouse killer made up in convenient package form for resale to public. Also illustrated are resale packages of dog repellent, moth killer, etc. Included in the booklet is reprint of an article on Red Squill by Leonard R. Parkinson, Agr. Exp. Station, Massachusetts State College. WRITE PESTS—OHIO.

CALCIUM CYANIDE FOR RAT CONTROL

36-page booklet contains excerpts from official publications and reports of health officers throughout the world regarding use of calcium cyanide in the control of rats. The widely differing conditions surrounding infestations, and the specific types of control for each, which are described, will serve as suggestions to health officers and others in solving similar problems. WRITE PESTS.

THE ACTIVATING EFECT OF PYRETHRUM UPON THE GERMAN COCKROACH

Research material prepared by John M. Hutzel, of the Ohio State University, Columbus, Ohio in cooperation with the Kenya Pyrethrum Extension Service, Inc., N. Y. Supervised by Professor F. L. Campbell.
WRITE PESTS—PYRETHRUM.

INSECT POISONING AGENTS

"Thanite, quick death to insects" is a 12-page booklet presented in Basic English with a view to international use. It discusses the development and applications of the product.
WRITE PESTS—HERCULES.

ELECTRIC FANS HAVE SEVERAL USEFUL FUNCTIONS IN FUMIGATION WORK

Ways in which fans may be used to promote circulation and penetration of gas during fumigation are described in this bulletin. WRITE PESTS—AC 84.

BIRD REPELLENT

Circular describes product which manufacturer claims will serve as an effective repellent against pigeons, starlings, bats, dogs, cats, rats, mice, woodchucks, moles as well as crawling and flying insects that prey upon plantings and seedlings.
WRITE PESTS—PX.

BOX CAR FUMIGATION

Folder describes box car fumigation with methyl bromide, giving details as to: car seal, applicator arrangement, methyl bromide application, dosage, exposure period, temperature, aeration, precautions.
WRITE PESTS—DOW.

PRESERVATION OF LUMBER, POLES, POSTS, PLYWOOD WITH PENTACHLORPHENOL

This bulletin gives a brief summary of the properties, use to date, and recommendations for the preservative treatment of lumber, poles, posts, and other forest products with Permatox A. This product, it is stated, has shown outstanding promise as an effective and permanent oil preservative for many wood products. Set forth briefly also, are recommendations for the effective preservative treatment of lumber, poles, posts, and other forest products with Permatox A, based upon experience to date.
WRITE PESTS—BULLETIN 43-A.

NEW ANT TRAP

Manufacturer claims many new features such as no turning or twisting necessary; four openings; larger trap; contents ½ greater than any other competitive brand.
WRITE FOR YOUR FREE SAMPLE OF ANT TRAP TO NOTT, c/o PESTS.

WOOD PRESERVATIVES

Discussed are several products for the control of decay, blue stain, termites, powder post beetles, swelling, warping, checking, shrinking, moisture absorption, grain raising. Illustrated.
WRITE PESTS—PRESERVATIVES (W).

PIGEON-PROOFING

Folder describes pigeon-proofing invention which manufacturer claims will completely and decisively eliminate the pigeon nuisance. In use by real estate companies, churches, government buildings, etc.
WRITE PESTS—STANLEY.

FIRST AID AND TREATMENT FOR METHYL BROMIDE EXPOSURE

This valuable booklet, prepared by Dr. H. H. Gay, Medical Director, The Dow Chemical Company, Midland, Mich., outlines first aid and treatment for Methyl Bromide exposures. Contents are based upon what is believed to be sound medical practice. Digest follows: properties of Methyl Bromide, symptoms of Methyl Bromide exposure, first aid, suggested treatment by a physician, skin contacts with Methyl Bromide. Copy may be had by writing Dow direct, or
WRITE PESTS—GAY.

SAFETY IN FUMIGATION WORK

Fumigation Safety Rule No. 1; namely, "Vacate entire building even though only part is fumigated, as well as adjoining buildings into which gas may penetrate" is discussed in this bulletin.
WRITE PESTS—AC No. 78.

ALL-PLASTIC GOGGLE

Circular describes a new lightweight, all-plastic goggle which provides comfortable, durable protection for the eyes. The individual eye cups are moulded to fit the facial contours, giving a close yet comfortable seal around eye orbits, according to the circular. Particularly useful for spraying in termite control, as well as heavier bedbug spraying operations, to prevent direct sprays from getting into the eyes themselves—available in different models.
WRITE PESTS—MINE.

FUMIGATION AND PLASTICS

News release discusses use co-ordination of such diverse chemical products as plastics and fumigants in connection with infested bagged grain, seed, packaged or boxed foodstuffs. Methyl bromide-plastic-tarpaulin method of disinfestation described.
WRITE PESTS—DOW.

RESPONSE OF RATS MAINTAINED ON DIETS FUMIGATED WITH METHYL BROMIDE

Research material reprinted from Food Research
WRITE PESTS—DOW-RESEARCH.

Business Opportunities

(Classified)

RATES — For individuals seeking employment, 5c per word, minimum $1.00. All others 10c per word, minimum, $2.00. All advertisements must be in the hands of the publishers seven days before publication date and must be accompanied by cash or money order for payment in full. The publishers are not responsible for any false or misleading advertisements.

Replies to advertisements where box number only is indicated should be addressed c/o PESTS, 1200 Oak St., Kansas City 6, Mo., giving box number as well.

WANTED: Established Pest Control Business with a good reputation. Southwest preferred. Box 19, Pests.

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AMERICA'S FINEST FOR 16 YEARS

Guaranteed to Outwear and Outlast any Other Hose or Money Refunded

WHY BUY DATA

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★ Built for the Job Exclusively
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Also Rock Wool Hose and Cyanide Hose

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"TOX-EOL" 12½ TO 1 SUPER CONCENTRATE

NOW AVAILABLE WITHOUT PRIORITIES

FOR TERMITE CONTROL

Chlorinated Phenol Toxic Base, which has been effectively used for many years by the larger Termite Control Operators from Coast to Coast in the "TOX-EOL SYSTEM" of Termite Control.

This new super strong CONCENTRATE may be diluted with 12½ parts Fuel Oil, Kerosene, or even Crank Case drainings to make the proper strength (over 5%) treating solution.

"TOX-EOL" 12½ CONCENTRATE means lower transportation charges, fewer containers—lower chemical cost. Now costs less than creosote.

FOR WOOD OR SOIL TREATMENT

Write for our plan of dealer co-operation and 5 year Warranty.

CRE-O-TOX CHEMICAL PRODUCTS COMPANY

Pioneers in the use of Chlorinated Phenols for termite control.

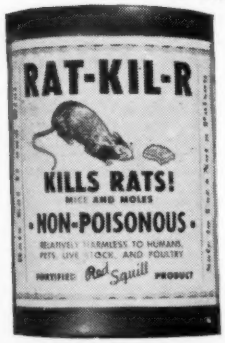
MADISON AT WILLETT MEMPHIS 4, TENNESSEE

You can sell ANYTHING ONCE . . .
BUT—RAT-KIL-R—Repeats and REPEATS!

RAT-KIL-R

KING OF RED SQUILL BAITS

• NON-POISONOUS •



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- 6 Different Flavors
- Contains Real Fish Meat
- Always Fresh—Ready to Use

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Add RAT-KIL-R to Your Line.

Use or Sell Under Your Own Name—As You Like.

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We Ship a Pound or a Ton in Bulk or Package.

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THE BIG RAT BAIT MONEY MAKER!
USED AND SOLD BY EXTERMINATORS THROUGHOUT U. S. A.

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MAIL POST CARD FOR SAMPLE AND PRICES

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AMERICAN WORLD CHEMICAL CO.
411 North 10th St. St. Louis, Mo.

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These Products Will Also Make You Money

- FLY-KIL CONCENTRATE
- ROACH-KIL CONCENTRATE
- INDUSTRIAL DISINFECTANT
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- INSEC-GAS FUMIGANT
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CENTROBULBS

The Favorite Bellows with PCO's Everywhere

Better than pre-war.

Bulb made of synthetic rubber.

Works better, lasts longer, snappier.

Oil and grease resisting.

Perfect invisible seams.

Nozzle made of heavy die-cast metal with cut threads.

Large opening for quick refilling.

Made to form-fit hand of pest control operator.

In dozen lots or more of a size

12 Oz.	$9.00 doz.
8 Oz.	7.20 doz.
4 Oz.	3.00 doz.

F. O. B. New York

Central Rubber Products Co., Inc.
821 Broadway New York 3, N. Y.

FUMIGATION SAFETY RULE

Bulletin discusses importance of personal inspection of entire premises immediately before releasing gas, and offers some constructive suggestions with respect thereto.

WRITE PESTS—AC 81.

STERILIZING GAS MASKS

News bulletin describes a chemical that is claimed by the manufacturer to be effective in sterilization of gas masks. Bulletin also discusses antidotes and first aid, particularly an inhalant which functions best as an antidote to HCN poisoning, and where obtainable.

WRITE PESTS—AC-73.

FUMIGATION SAFETY SUGGESTIONS

Of timely interest, in view of the at-hand fumigation season, is this bulletin which advocates as a safety measure the use of methyl orange-mercuric chloride test papers for the presence of HCN. It also discusses can openers for Zyklon Discoids, the need for adequate ventilation after fumigations, and gives a cautionary note on pilot lights in premises to be fumigated.

WRITE PESTS—AMERICAN.

TERMITE CONTROL

Folder discusses concentrates available for two distinct methods of termite control: (1) treatment of timbers in place with an oil solution, and (2) treatment of all soil around an infested building or area with either an oil or water soluble chemical. Issuing company states it specializes in all problems concerning wood-destroying organisms and also wood preservation and invites your inquiries thereto.

WRITE PESTS—WOOD.

MILITARY FUMIGATION MANUAL

This special 48-page manual has been prepared for the benefit of officers and civilians in the Armed Forces who are responsible for vermin control, and for PCOs who may contract with the Armed Forces for fumigating work. Among other subjects, the manual discusses: dosage, preparation of building for fumigation, fumigation operation, common pests, cockroach control; precautions, first aid methods, etc.

WRITE PESTS—AC.

SYNTHETIC ROACH POWDERS

Research material apropos thiocyanates in powdered form for roach control in place of pyrethrum—describes the development and properties of roach, ant and bedbug powder based on Lethane A-70.

WRITE PESTS—SYNTHETIC.

SPECIAL ROACH POWDER

Circular describes a roach powder (containing Lethane A 70) which, it is stated, is fast acting, positive in kill and will not deteriorate for at least eight weeks after application. As a result, the supplier points out, the PCO does not have to service his customers as often, thereby conserving manpower. Moreover, it is stated, the powder is non-toxic to warm-blooded animals and may, therefore, be used in dairies, packing and food handling plants, homes, etc., in fact, in all places where sodium fluoride mixtures may not be used. . . . Described also is a sodium fluoride-Pyrane formulation for the PCO who wishes to make his own roach powder.

WRITE PESTS—BOSLEY.

LETHANE A-70

Folder discusses roach, ant and bedbug powders based on this new insecticide concentrate. Described are: safety factors, cost per application, killing power, performance data, residual activity, tenacity, etc.

WRITE PESTS—A-70.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS.

WRITE PESTS—SOLVAY, c/o PESTS.

NEW RAT BAIT

The current difficulty of procuring rat baits because of meat rationing has been overcome by the discovery on the part of numerous PCO's of Vegex Dry Gravy, states its manufacturer.

This product with a delicious meat flavor, and high in hydrolized vegetable protein seems to be an irresistible lure for rats, according to the same source. It has many advantages. It is instantly prepared by simply adding water and boiling up once.

The prepared bait can be handily carried in the kit, and the bait need never be touched, as bread can be dipped in the poison mixture by tongs. Keeps indefinitely and needs no refrigeration, it is stated.

Results with Vegex Dry Gravy have been so good in rodenticide work, and the Gravy is so inexpensive and easily handled that PCO's who have used it are expecting, according to the supplier, to continue even after war rationing is a thing of the past.

The Vegex Company, located at 175 Fifth Avenue, New York 10, N. Y., puts up this Dry Gravy in 5-pound packages only. One 5-pound package makes 5 gallons of finished Gravy. Prices and other pertinent data on Vegex Rat Bait may be had by writing the company.

DEODORANT

Catalog includes price data, etc., on deodorant which it is felt can neutralize and deodorize such toxic agents as Thanite, Lethane 384 Special, Velsicol, etc. Also contains data on perfume oils for sprays made with pyrethrum and kerosene.

WRITE PESTS—MAGNUS.

METHYL BROMIDE

What it is; what it does; how to use it—all these questions apropos methyl bromide are covered in an instructive and informative brochure. Described are dosage schedule for various type pests, methods of application and preliminary precautionary measures.

WRITE PESTS—Westvaco.

ALABAMA OPERATES STATE-WIDE RAT CONTROL PROGRAM TO STOP SPREAD OF TYPHUS FEVER

An article written by Dr. Andrew J. Perolio, State Director of Typhus Control of the State of Alabama which describes the State's program for stopping the spread of typhus fever.

WRITE PESTS—AC.

Hydrocyanic Acid Poisoning—Skin Absorption

Bulletin discusses some pertinent safety suggestions with respect to avoidance of hydrocyanic acid poisoning through skin absorption.

WRITE PESTS—A-C-74.

CONTINUOUS INTIMATE BLENDING

A bulletin on the intimate blending of fine chemical, food and insecticide powders has recently been issued by Sprout, Waldron & Company, Manufacturing Engineers. In addition to a description of Blending Systems designed for continuous, automatic operation, there is a page of photographs which show the difference between intimate blending and conventional mixing as revealed by typical spatula tests. Copies of this 8-page bulletin in two colors may be obtained from PESTS—SPROUT.

REMOVAL OF PHOTOGRAPHIC FILMS AND PAPERS BEFORE FUMIGATION

is the title of an interesting and informative Bulletin which discusses the effects of hydrocyanic acid vapors upon unexposed photographic film. Other subjects discussed are: "High Temperature Necessary for Winter Fumigation"; "The Rat Menace—An Opportunity to Cooperate.".

WRITE PESTS—A-C-88.

INSECT COLLECTIONS

Booklet describes pocket display case which may slip easily into a coat pocket making it of value for salesmen or others who travel about. Life history collections of structural type pests are also available for the PCO.

WRITE PESTS—WARD'S.

EFFECT OF HYDROCYANIC ACID ON FOODSTUFFS

This bulletin answers some highly interesting questions as to the effect of HCN on footstuffs.

WRITE PESTS—A-C 89.

THALLIUM PRODUCTS

Circular calls attention to ant traps and jelly bait for control of ants—house or garden; mice seeds, rat paste, etc.

WRITE PESTS—NOTT.

RESPIRATOR

Bulletin discusses "Clear-Vue" model Dustfoe Respirator, which it is stated is durable, odorless, noncorrosive and a non-conductor of electricity and heat and gives a proved protection against toxic dusts.

WRITE PESTS—DUSTFOE.

HYDROCYANIC GAS MASK

Bulletin describes Hydrocyanic gas mask with all-vision facepiece.

WRITE PESTS—MINE.

NEW PERFUMING PRINCIPLE FOR INSECT SPRAY TOXIC AGENTS

Perfume Oil Fruit Berry MM&R is called the first new and different neutralizer-perfume in a decade, by Magnus, Mabee & Reynard, Inc., New York essential oil house.

Perfume Oil Fruit Berry MM&R not only neutralizes the odor of toxic agents, but imparts a truly refreshing fragrance of uncommonly light character. It has a definite fruity scent. A remarkable feature is that it has so light a fragrance, yet has the hiding power to give lasting coverage of heavy odors. This feature will be of particular interest for sprays used in food plants, bakeries, etc.

Fragrance of sprays, up to now one of the unmentionables of insect toxicants, now becomes an asset instead of a liability. Samples may be had by writing PESTS—MABEE.

DDT IS POISONOUS

An article by Herbert O. Calvery, Food and Drug Administration, which discusses tolerance level deemed necessary when it is used on human food.

WRITE PEST—POWELL (C).

NEW RECHARGEABLE FLASHLIGHT BATTERY

Forty per cent greater capacity and higher sustained bright light is claimed for a new, improved model Rechargeable Flashlight Battery announced by the IDEAL Commutator Dresser Co.

The present Battery is the result of several years of intensive research stimulated by the success already obtained from previous models now in service.

Originally introduced five years ago, this type of Battery has played an important part during the war which caused a scarcity of dry cells.

The IDEAL Battery, it is stated, may be charged from any AC Electrical outlet by means of a rectifier type charger or from the DC ignition system of automobile, truck or bus.

Where flashlights are used regularly, the rechargeable feature of the Storage Battery is said to provide greater economy and brighter, sustained light.

WRITE PESTS—IDEAL.

MOTH DAMAGE PREVENTIVE

Leaflet discusses value of para-dichlorobenzene in moth control, directions in using, and its value as a deodorant. WRITE PESTS—SOLVAY (M).

EDUCATE THE DOCTOR IN FUMIGATION FIRST AID PROCEDURE

Is the title of this instructive Fumigation News Bulletin, which lists some constructive ways in which the PCO can help the doctor to prevent fumigation fatalities. Also discussed are: Fumigation Chamber, Fumigation Prospects, Wholesale Grocers.

WRITE PESTS—A-C 92.

RED SQUILL FOR RAT CONTROL

An informative brochure on the value of red squill in control of rats, mice; its effect on domestic animals and man.

Also discussed are bait procedure, pre-baiting, and use of red squill in extended rat programs, attractants, research in rat-food selection, etc.

WRITE PESTS—PENICK.

ELECTRIC FANS

Bulletin discusses value of electric fans in connection with fumigation work, also some pertinent thoughts on the Schafer Prone Pressure Method of Resuscitation, etc.

WRITE PESTS—AC-69.

Advantage of low dosage fumigation at frequent intervals—warehouses and factories—is discussed in this bulletin. Inadvisability of fumigating cold houses also reviewed.

WRITE PESTS—AC-90.

ANIMAL ODORS AS REPELLENTS AND ATTRACTANTS

Incorporation of the glandular extraction of the skunk into commercial repellents to add to their potency and efficacy is discussed in an interesting article, entitled "The Odor of an Enemy, the Cat, Frightens Mice Away," by Charles V. Sparhawk. In it he also discusses the use of a small quantity of a muskrat bait in the form of a gland as a powerful attraction to any creature that feeds on meat, such as mosquitoes, flies, ticks, lice, rats and mice, etc.

WRITE PESTS—SPARHAWK.

NH DUST

Leaflet describes new organic insecticide compound which, it is stated, may be used where non-poisonous insecticides are mandatory. Effective against roaches, silverfish, ants, fleas, lice and many other common pests found in the home, industrial and food storage plants.

WRITE PESTS—POWELL.

FUMIGATION SAFETY RULES

Bulletin discusses fumigation safety rules with respect to mattresses, pillows, bedding, clothing and bedroom rugs, etc.

WRITE PESTS—AC No. 79.

Case History*

FUMIGATION OF MEAT-PROCESSING PLANT

The Party's Over For Mice and Roaches

*Actual record is on file at The Dow Chemical Company

Mice and roaches began to gather in a Midwest meat-processing plant. Fumigation was difficult because of the danger of spoiling the meat. Then Dow Methyl Bromide was tried—and the party was over! Here are the details of this fumigation success story:

Preparation: Building sealed with masking tape, greased kraft paper, and a putty made of 8 parts of powdered asbestos, 3 parts calcium chloride, and 4 parts water by weight.

Dosage and Exposure Period: One pound of Dow Methyl Bromide per 1000 cubic feet, for a 24-hour period.

Method of Application: Methyl Bromide released from cylinders and circulated by fans.

Aeration Period: 1½ hours.

Results: Thorough inspection disclosed an apparently complete kill of all roaches and mice in the fumigated area. Meats showed no alteration in odor and taste . . . no other ill effects.

This is only one example of the complete, practical eradication that can be achieved with Dow Methyl Bromide. Find out how Methyl Bromide can help simplify *your* difficult fumigation problems!

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis
Houston • San Francisco • Los Angeles • Seattle

The penetrating fumigant

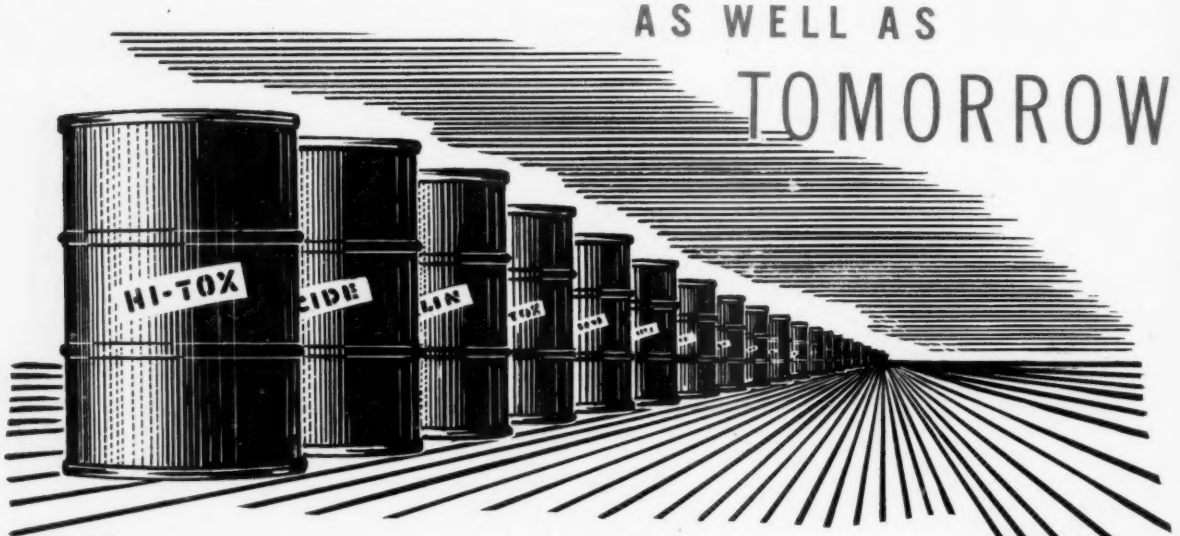
Methyl Bromide

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

PRODUCTS for TODAY

AS WELL AS TOMORROW



HI-TOX, MORTICIDE, SUPER-MORTICIDE and MORTOLIN have been available continuously, without restriction or allocation, all during the War Years. Many PCOs have used our products with the high satisfaction to be derived from fine quality concentrates. The Industry has learned to depend upon the efficiency and reliability of the Associated Chemists Line.

HI-TOX, MORTICIDE, SUPER-MORTICIDE and MORTOLIN will continue to be available—TODAY and TOMORROW! These products will hold their position in the front line of dependable insecticide concentrates. We are proud that we have been able to serve the Pest Control Industry during these hard and trying times. We are proud that we have been able to furnish the Trade with insecticides upon which they were able to rely. We are satisfied that the PCOs loyalty to Associated Concentrates will continue long after War scarcities have ceased to exist.

If you have never used one or more of the Associated products, order from our office nearest you—Order a sixty day supply—all freight lines are congested nowadays—and be assured of stock on hand WHEN YOU NEED IT.

Associated Chemists, Inc.

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